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Aviation Week

ABP Member ABC

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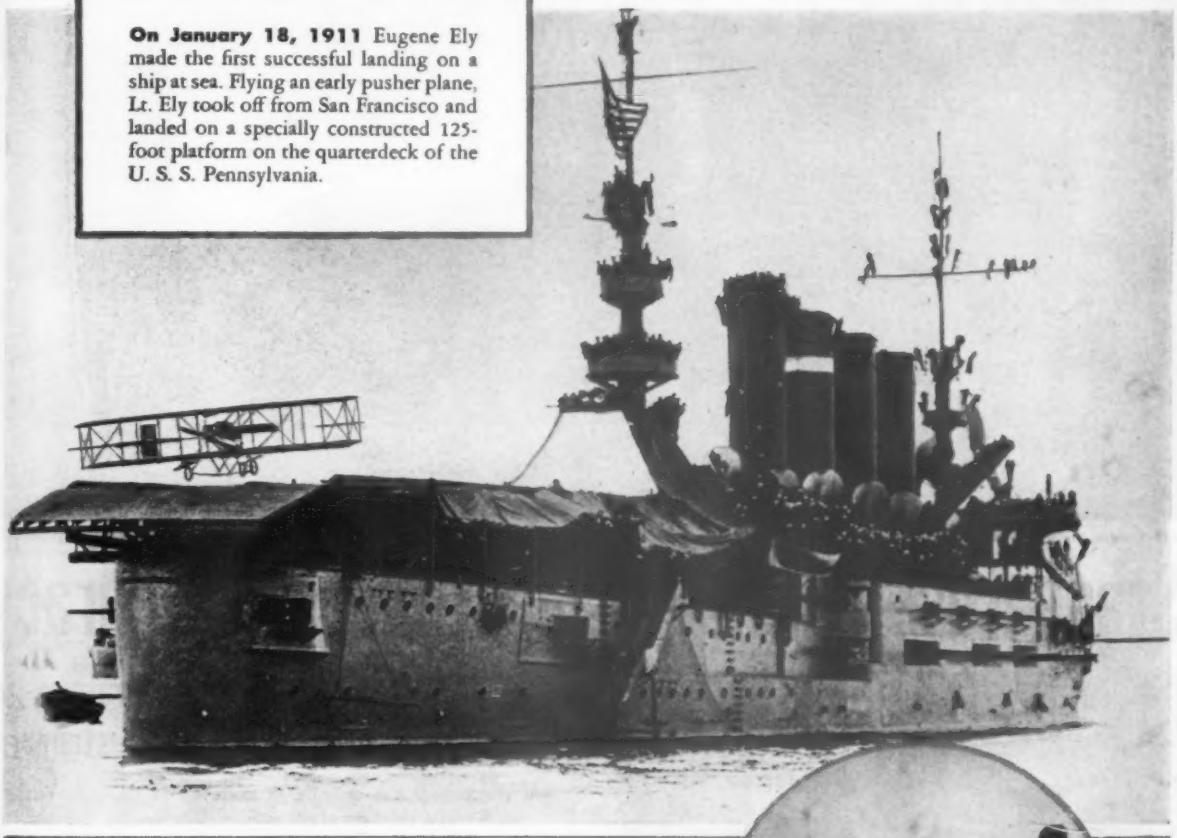
FIRST LANDING ABOARD SHIP—1911

On January 18, 1911 Eugene Ely made the first successful landing on a ship at sea. Flying an early pusher plane, Lt. Ely took off from San Francisco and landed on a specially constructed 125-foot platform on the quarterdeck of the U. S. S. Pennsylvania.



Eugene Ely's pioneer landing aboard the U. S. S Pennsylvania was the beginning of shipboard aviation. Although years were to pass before the U. S. Navy commissioned its first aircraft carrier, the Langley (converted from a collier), Ely's flight marked the dawn of a new era in naval strategy and tactics.

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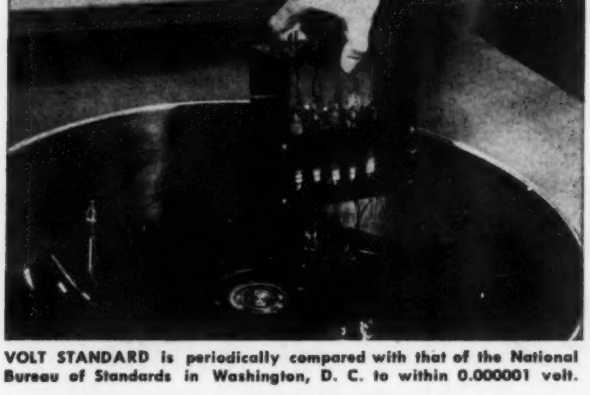
For information about other ways in which the new G-E Measurements Laboratory helps assure dependable aircraft instruments, contact your G-E aviation specialist or write Section 607-22, General Electric Company, Schenectady 5, New York.



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NEWS DIGEST

UAL DC-6Bs Fly

United Air Lines placed its DC-6Bs in operation for the first time last Wednesday after UAL pilots agreed to call off their three-months refusal to fly the bigger, faster transports. The 58-passenger planes initially were placed in extra-section service on the Pacific Coast, serving Los Angeles, San Francisco, Portland and Seattle-Tacoma, to relieve the heavy demand for space on UAL's regular flight caused by strike of Western Air Lines.

With the planes back in service, the airline last Thursday reactivated 9,300 mi. of schedules which had been canceled July 18 because of equipment shortage when the pilots refused to fly the new Bs.

Institution of DC-6B service reopened the way for pilots and management to pick up labor contract talks where they broke off last Mar. 29, when UAL pilots took their strike vote against the airline.

National Mediation Board Representative John F. Murray immediately opened the whole range of pilot-management problems for negotiations.

General negotiations for a new UAL contract began two years ago but had broken down repeatedly. The last breakdown came after the ten-day strike that grounded the entire airline in June. The pilots had ended their walkout June 29, but refused to fly Bs.

DOMESTIC

Shipments of personal airplanes during June totaled 208 units with a value of $1,541,000, reported by four companies, as compared with 232 units shipped the previous month by nine companies. June shipments included 50 two-place and 158 four-place or more. Complete aircraft shipped from January to June of this year, as reported to Aircraft Industries Assn., totaled 1,418 valued at $10,418,000.

Pacific airlift planes of all nations and operators flew 243,790,154 ton miles from July 1, 1950, through June 30, 1951, according to Military Air Transport Service. The total includes 160,084,286 cargo and mail ton miles and 748,818,458 passenger miles.

Gen. Omar N. Bradley last week was named for a second term as chairman of the Joint Chiefs of Staff (AVIATION WEEK June 25, p. 18) by President Truman. Bradley's name was forwarded to Congress for confirmation along with that of Francis P. Whitehair, nominated by Truman to the post of Undersecretary of the Navy (AVIATION WEEK July 30, p. 8). Gen. Bradley had planned to retire Aug. 15, following completion of his present tour of duty on the JCS, but was asked to remain by Truman for another term to maintain stability in JCS military planning during the present international crisis.

FINANCIAL

Republic Aviation Corp. reports a net income of $1,349,532 for the first half of 1951 after provision for taxes. Sales for the period totaled $52,281,021. Backlog was reported as over $550 million.

North American Aviation, Inc. has reported a net income of $4,450,000 after taxes, in preliminary unaudited figures, for the period between Oct. 1, 1950, and June 30, 1951, first nine months of its fiscal year. Sales and other income for the period were $119,797,390. Unfilled orders at June 30 were $510,207,542.

Aeroquip Corp. reports sales for the nine months ended June 30 of $9,901,000, with net income of $683,724 after taxes and provision for preferred dividends, but not including provision for renegotiation. The board has declared a fourth quarterly dividend of five cents per share payable Aug. 15 to holders of record on Aug. 1.

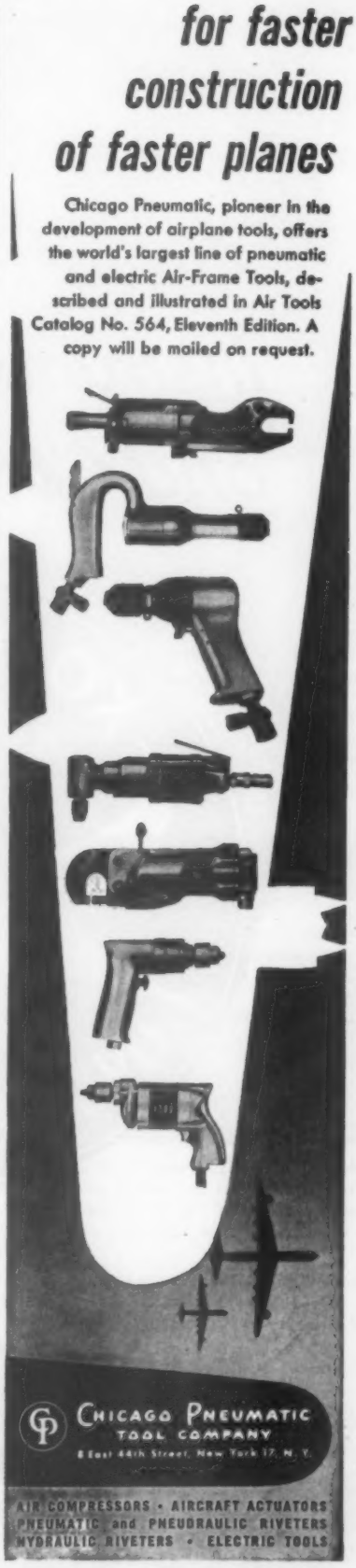
Fairchild Engine & Airplane Corp. directors have declared a dividend of 20 cents per share payable on Sept. 5 to holders of record on Aug. 15.

INTERNATIONAL

Canadian Wright Ltd., Montreal has received a $17-million order to modify and repair Rolls-Royce Merlin engines for the RCAF over a four-year period. Standard Aero Engine Ltd., Winnipeg, was awarded a $2-million order for aircraft engine repairs.

Avro 707A delta-wing research plane has made its first flight. The 707A differs from the previous 707B in that it has the air intakes for the Rolls-Royce Derwent jet engine located in the leading edges of the wings at the wing roots, and the 707B has the intakes located atop the fuselage behind the pilot.

British European Airways Corp. had between 30 and 50 flights interrupted late last month when members of the Assn. of Supervisory Staff, Executives and Technicians rejected a wage offer made by BEA and BOAC. Following negotiation, an agreement was reached and service resumed.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SIDELIGHTS

Making It Legal?

Some Washington observers expect Civil Aeronautics Board action soon on the applications of Transocean and Seaboard & Western for certificates as **overseas freight carriers.**

Their case went through oral argument before CAB late last year, so at the Board's present rate, it should be reaching a decision soon. Whether or not their certificate applications are approved, CAB sources expect both to go on doing a high volume of business, especially military contract, as large irregular carriers. These observers expect that if the carriers are denied their requests for certificates of public convenience and necessity, they will nevertheless get individual exemptions as large irregulars. These two airlines and Airline Transport Carriers, Inc., were erroneously shown as having individual exemption applications disapproved by CAB or a CAB examiner in a table presented to congressional committee by the Air Coach Transport Assn. and reprinted in AVIATION WEEK July 16. The two large international nonskeds have not come up for individual exemptions yet but had their certificate applications recommended for denial by CAB Examiner Warren Baker. The CAB approved Airline Transport Carriers, Inc., on July 3, since preparation of the table.

Air Power Build-Up

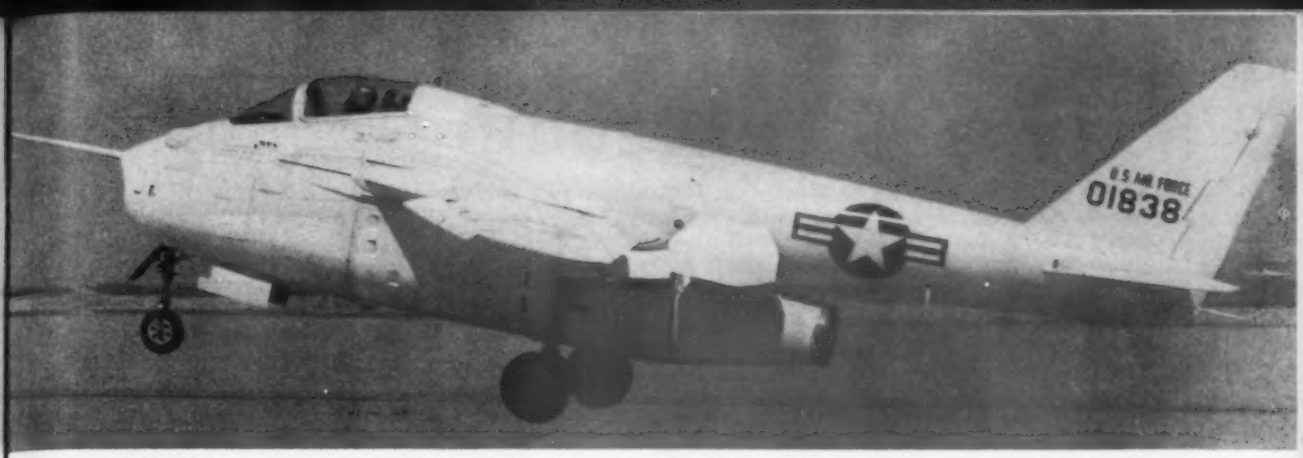
There is general agreement in Washington that a **build-up in air power** seems inevitable in the next few years. But military leaders are far from agreement on what kind it will be.

Despite gossip to the contrary, many Navy people agree that the next Chief of Naval Operations, whoever he is, will adhere to the policy advanced by Adm. Sherman against a substantially larger Air Force expansion over Naval aviation . . . Published estimates of a **150-wing Air Force** set the cost of such an air force at about $33 billion in 1953 and indicate it cannot possibly be achieved by year-end 1953 without a virtual all-out mobilization. In addition, this would mean a $60-billion defense budget next year instead of the proposed 25% cut.

Air Force

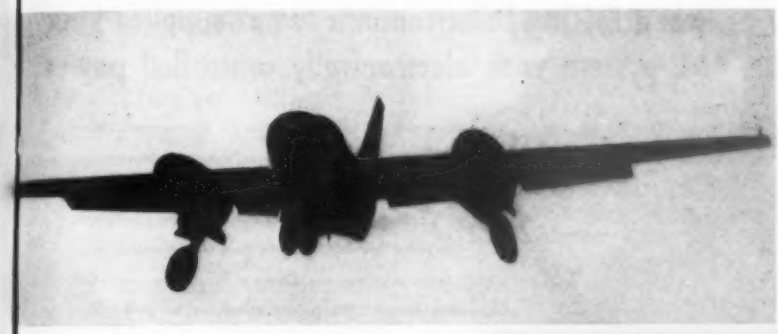
Edward T. Dickinson, 40, has been named **Deputy for Installations.** Former marine and member of OSS, he will be responsible for expediting development of the USAF air base structure both in the U. S. and abroad. The current air base program as presented to Congress envisions a $3.5-billion expenditure on approximately 250 air bases throughout the world . . . Harold C. Stuart, Oklahoma City lawyer and former Assistant Secretary of Air Force, has been nominated to be president of **Air Force Assn.**, and Thomas G. Lanphier, assistant to the president of Consolidated-Vultee and former

(Continued on page 64)



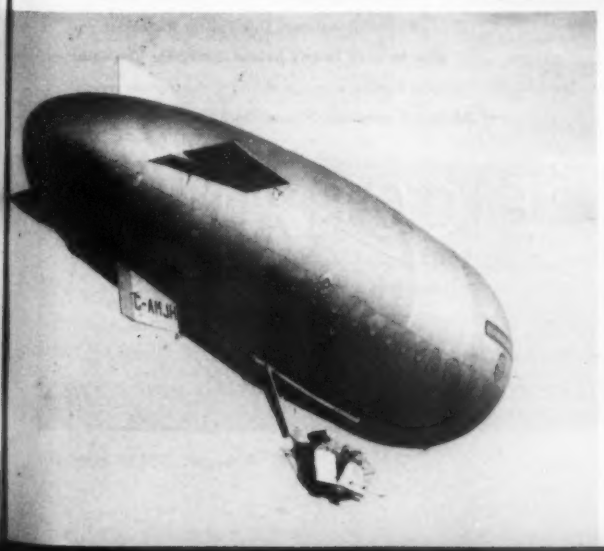
BELL X-5 TESTED—With its wings in the full forward position, the variable-sweep Bell X-5 research plane returns to Muroc AFB after a successful flight test. Close study of the photo indicates that the X-5's wings move forward along the fuselage as the sweep is varied. Powerplant is a single Allison J-35-A-17 rated at 4,900-lb.static thrust.

Aviation News Picture Highlights



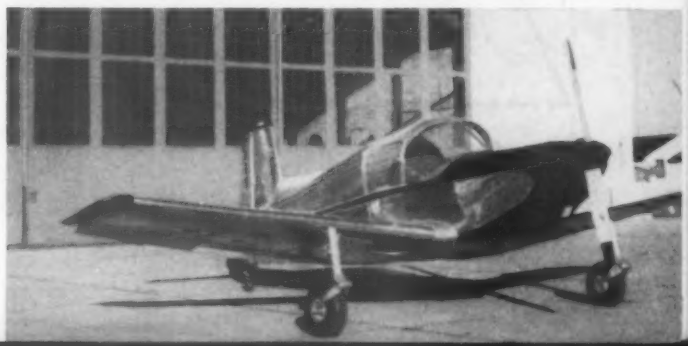
SOVIET SILHOUETTE—Twin-jet light bomber, (left) reported to be in service with Soviet Air Force, has been tentatively identified as the Tu-10. The tricycle landing gear has dual wheels on the nose gear. For identification purposes, the Tu-10 can be spotted by its single fin and rudder, high aspect ratio wing set high on the fuselage. The plane has been seen fitted with tip tanks. Three versions of the Tu-10 are believed operational: a bomber with transparent nose, a bomber with solid nose and belly radome, and a trainer with solid nose.

4-0-4 FIRST FLIGHT—Carrying TWA markings, the new 40-passenger Martin 4-0-4 (right) is seen in the air near Baltimore during its initial flight which lasted 98 min. Designed and structurally stressed to take turboprop engines, the plane now has P&W R-2800CB-16 engines of 2,400 hp. each turning three-blade Hamilton Standard props of 13 ft. 1 in. dia. TWA has ordered 41, EAL 40 and the U. S. Coast Guard 2. One of TWA's 4-0-4s will go to Howard Hughes for special work.



NEW BRITISH AIRSHIP—The Bournemouth (left), built under the direction of Lord Ventry, is said to be the first British airship to fly in 20 years. It has a capacity of 45,000 cu. ft., is 108 ft. long. Powerplant is 65-hp. Salmson engine. Airship was filled with hydrogen for flight.

NEAT LITTLE TOURIST—Small, two-place McKinnie 165, designed and built by Richard McKinnie of Fargo, N. D., has a Franklin 165-hp. engine and a cruising speed of 180 mph. at 7,000 ft. Empty weight is 960 lb.



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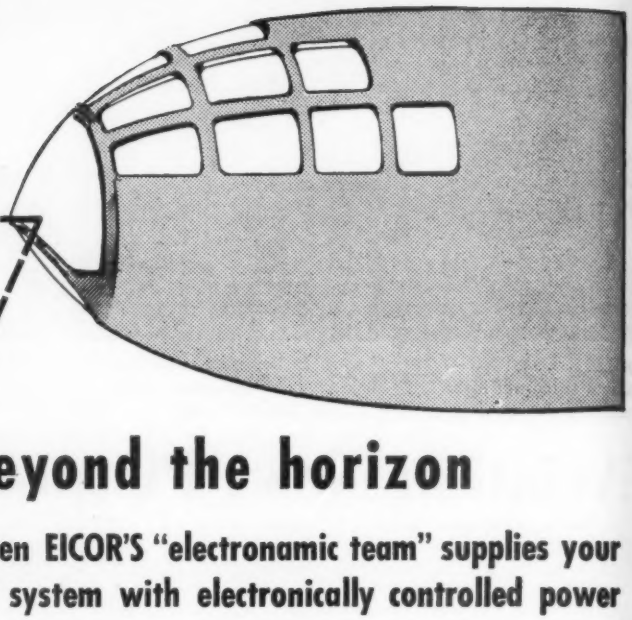

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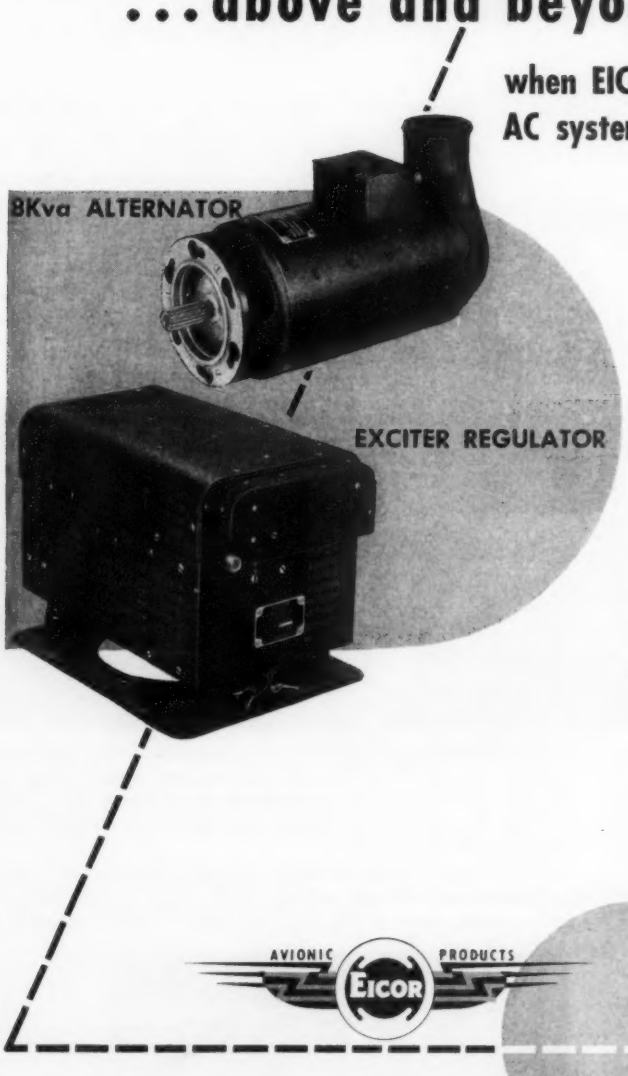

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WHO'S WHERE

In the Front Office

Frits Besancon, formerly vice president in charge of KLM Royal Dutch Airline's operation and technical departments at Schiphol Airport, Amsterdam, has been named executive vice president of the carrier.

Raymond Tonks has been designated vice president-general manager of Southern California Aircraft Corp., Ontario, Calif. He was formerly general manager of Pacific Airmotive Corp.'s Burbank division. **Joe Petrali** previously of the flight and service department of Hughes Aircraft Co., has been appointed assistant executive vice president of SCAC.

Col. John S. Griffith has been appointed assistant to the president of Aircraft Engine & Parts Corp., N. Y. C. Col. Griffith retired from the USAF on July 1 after 30 years of service. During World War II he was director of maintenance for the Strategic Air Force in Europe.

What They're Doing

Myron B. Gordon, formerly vice president-general manager of Wright Aeronautical Corp. and subsequently vice president-operations, Fairchild Engine & Airplane Corp., has become associated as a consultant with the office of Laurance S. Rockefeller, in connection with Rockefeller Brothers' various aviation enterprises.

William B. Yeager has resigned as vice president, secretary, treasurer and member of the board of Menasco Manufacturing Co.

John E. Dowling, former special agent with the FBI, has been named eastern regional claims manager for United Air Lines.

Changes

Charles L. Morris has been appointed service manager for Kaman Aircraft Corp.

L. G. Frise has been designated technical director to the board of Percival Aircraft Ltd. He has been chief engineer and chief designer with the company for nearly three years.

C. D. Perrine, Jr., former specialist in missile homing guiding systems, has been named assistant chief engineer in charge of electronics at Convair, San Diego. **J. F. Schirtzinger** has been designated assistant chief engineer in charge of administration and the experimental factory at this location.

Edward E. Magee has been appointed representative for Cannon Electric Co., Los Angeles, at Wright-Patterson AFB.

George E. Shedd has been appointed manager of Chicago & Southern Air Lines' domestic and international agency and interline sales, succeeding **K. J. Howe,** who resigned to become sales manager of the Arkansas Automobile Club.

Violet Corrington has been designated flight service superintendent in charge of all pursers and hostesses for Pan American-Grace Airways.

INDUSTRY OBSERVER

► First twin compressor U.S. turbojet off the production lines will be the Pratt & Whitney J-57, according to present schedules. Curtiss-Wright Corp. is testing the British Bristol Olympus which is also a dual compressor configuration, and is likely to put it into production. Dual compression would introduce greater weight, but this could be offset by load saving afforded by the engine's reduced fuel consumption.

► **British jet engine manufacturers are taking on the assignment of overhauling their own engines for British airlines during the flight testing period of the new British jet transports. It has been planned that way to give the design engineers and the production specialists a chance to see how the components hold up in service and to catch any bugs or weaknesses fast. It is doubtful if the overhaul practice will be continued by the manufacturers after the testing. Overhaul will then probably be taken over by the British airlines, according to their practice with piston engines.**

► Now that Glenn L. Martin Co. is getting some flight experience with the English Electric Canberra, which it is licensed to build in this country as the B-57A intruder plane, and with flight experience continuing on the Martin three-jet XB-51, there are some speed comparison reports getting out. It is said that the XB-51 is somewhere around 100 mph. faster than the Canberra.

► **Experimental flight research with new British jet transports indicates severe gust loads encountered occasionally at higher speeds are giving the airline planners some concern. Two alternatives, neither desirable, are being considered: To beef up the airframes further to take the loads at the higher speeds or to slow down on indication of turbulence.**

► Both XB-52 eight-jet bombers under construction at Boeing's Seattle plant are in final assembly stages and all major components are installed except engines. Pratt & Whitney J-57 engines will be delivered in sufficient quantity to enable the company to run engine tests and to make at least one of the bombers flyable by the end of the year (AVIATION WEEK July 30, p. 16). Engine delivery is expected to delay flight date of the second XB-52 about three months.

► **Air Force has completely abandoned the idea of turboprop engine installations for medium altitude fighter aircraft in favor of the turbojet. It holds to the idea that the turbojet-powered fighter is better able to defend itself in the air.**

► Fuel utilization of the turboprop engine is still much lower than that of the turbojet. USAF research personnel report, however, that the gap is rapidly closing because of the great emphasis being placed on turbojet development, and that "parity in fuel utilization can be expected ultimately between the two engine types."

► **Renewed USAF interest is developing in McDonnell Aircraft's XF-88 as a fighter-bomber. New emphasis being placed on Army's tactical aviation needs is said to be behind the move. Army tried vainly to convince USAF more than a year ago that it thought the XF-88 powered by two Westinghouse J-34 3,000-lb.-thrust jet engines the best answer to its needs for a tactical support fighter weapon. Army rates the plane high on its extreme-long-range characteristics and its capabilities as an aerial weapons platform.**

► Decision by Pratt & Whitney Aircraft not to accept more orders for the commercial R-2800 engine is based on greatly increased military demands (the engine will power a new Beech twin-engine advanced trainer) and already large commercial orders absorbing commercial production capacity through June, 1953 (AVIATION WEEK July 30, p. 7). Management will take another look later to see if it can resume deliveries in the second half of 1953. Meanwhile, the cut-off will affect placement of future orders for three of the current U.S. transports—Douglas DC-6, Convair 340 and Martin 4-0-4—all of which use the powerplant. It could mean pushing these planes into turboprop conversions sooner than had been expected, if commercial deliveries of turboprops can be made available.

Washington Roundup

Time for Decision

The Administration has marked down mid-October as the date for decision on the future of the defense build-up. That's the official word that has been passed on to congressional leaders. Administration just now isn't sure in which direction to move: Slow-down or step-up?

It wants to get its bearings in the international field during the next two months before deciding.

The new and all-important factor: Russia's aggressive world-wide propaganda offensive urging peaceful working-together between U. S. and USSR.

A long-time advocate of U. S. and USSR friendship, Alexander Troyanovsky, former Russian ambassador to the U. S., has unexpectedly emerged from obscurity to take part in the Soviet's new publicity strategy.

It puts the U. S. Administration on the spot.

- **If Administration leaders talk peace, what is left of the spirit of urgency in the "emergency" program on the home front may tend to evaporate.**
- **If they talk "emergency" and "war threat" and back it up with approval of the prompt step-up in the arms program proposed by the services—including a lifting of the USAF goal from 95 to 125, 150 or 175 wings and a boosting of the goal for Navy's striking air arm from 15 to 18 or 20 carrier groups, it will be harder effectively to convey U. S. peaceful intent to the rest of the world.**

Railroads: Friend of Nonskeds?

Nonskeds have a powerful bloc of friends: the railroads. Federation for Railway Progress is four-square behind the nonskeds drive to:

- Put mail pay to the scheduled airlines on a strict cost-of-service basis. (Association of American Railroads, the other railroad association, also backs this.)
- Let the Post Office have final say in channeling airmail, contracting shipments by nonskeds, if it sees fit.

FRP Vice President Robert Drysdale's comment to Senate Commerce Committee on the nonskeds: They "represent the finest spirit of American free enterprise. Young, intelligent, able to stand on their own feet. They ask no favor of the public. They are producing air transport service at a profit and selling it for cash in spite of constant harassment from vested interests which control CAB—the 'Club 16'."

But the nonskeds and the rails are soon to part.

- Nonskeds plan to open a drive for direct government subsidy grants. In legislation separating mail pay from subsidy, they want provision making them, as well as the scheduled lines, eligible for direct grants in the "commerce" and "national defense" interests. Both railroad associations want all air subsidization eliminated.
- The rail associations are renewing the push to cut off government funds for airports and airways programs. This would hit the nonskeds and scheduled lines.

Airmail Separation

Prospect now is that Senate Interstate and Foreign Commerce Committee will recommend legislation separating airmail pay from subsidy as follows:

- **Set statutory mail pay rates** for all domestic carriers—to be effective until CAB changes them. CAB and airlines oppose this, claiming it is "arbitrary." But senators take CAB's promise that it will have rates worked out for all domestic carriers by the end of September with a grain of salt.
- **Divide carriers** into five groupings, with rates ranging from 45 cents a ton mile for the Big Four up to $1.35 a ton mile for the local lines.
- **Require Post Office** to dispatch mail expeditiously and bar it from favoring larger carriers because of lower mail rates. Middle-size carriers, with routes paralleling Big Four routes, protested that if they have higher mail rates, the Post Office will channel all its business into the Big Four.
- **Set the Universal Postal Union rate** as the "maximum" for international carriers. It is now $2.86 a ton mile for first class mail, probably will be lowered slightly at UPU conference in Brussels this fall. PAA urged that the UPU rate be "the" rate; Northwest and Braniff wanted it to be the "minimum" rate.
- **Make public all direct subsidies** to air carriers. International carriers want this kept "executive"—made available to the committees of Congress, but not the public. They object that disclosure will make them the butt of criticism by foreign competitors on the grounds of being "government-financed."

Aluminum Hoarding

Senate's Small Business Committee plans to hold hearings in a few weeks on alleged hoarding of aluminum by big aircraft companies.

Committee investigators are now in California gathering data.

The investigation has been sparked by complaints of small concerns that they are losing business for lack of aluminum supply while aircraft companies are "oiling" stocks of aluminum because they won't have need of it for months to come.

Army: Land-Bound by USAF?

Defense Mobilizer Charles Wilson proudly reports that Army is going all-out to make itself airborne. It has:

- **3.5-in. super bazooka** that weighs less than its 2.3-in. World War II predecessor.
- **New intrenching tool** to replace the shovel, pickmattock, and ax of World War II, that weighs four lb. less.
- **Aluminum-nylon helmets** affording greater protection and weighing 8% less than the old ones.
- **Tropical combat boots** that weigh ¾ lb. less.
- **Mess kits** that weigh almost a pound less.

Army is now working all-out on lighter rifles, pistols, machine guns, and ammunition.

New Plants

The Administration's plan to build and operate defense plants is out. Congress turned it down. But Defense Mobilizer Charles Wilson still has authority to install government equipment and facilities in existing private and government-owned plants.

Wilson wanted the authority to build new plants primarily to expand electronics manufacturing capacity. It would be an "or else" club over private companies to convert to defense production.

Defense leaders anticipate electronics shortage will become an increasingly acute bottleneck in the defense program over the next year. —**Katherine Johnsen**

AVIATION WEEK

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Revolt of the Pilots—I

ALPA Switch May Aid Airline Relations

New leadership to have same policy, smoother methods.

By William Kroger

Airline management is due for a disappointment if it expects a change in the bargaining demands of the Air Line Pilots Assn. as a result of the ousting last month of President David L. Behncke.

The pilots' revolt that overthrew the founder and 20-year president of their union is not cut to the pattern that usually guides a sudden and dramatic change in leadership of a labor union. In the usual circumstance, a change in contract demands follows.

The airlines will find there has been no change in ALPA's objectives.

The switch in leadership heralds a change far more subtle to both management and union members. It is a change from Labor Leader to Labor Executive.

▶**Same Tune, New Score**—Management will hear the same refrain from ALPA, but the orchestration will be new. ALPA will sing of mileage increase determination (often mis-labeled "mileage limitation"), and reduction or some restriction of on-duty hours. What the airlines will find different is the manner and the persistence of the union in trying to attain those objectives.

Neither the goals nor the procedure to achieve them will be strange to union membership—if the new ALPA leadership is successful in its internal reorganization. The members are writing the catechism for the reformation. They intend to have a definable policy, which they say they didn't have under Behncke. The question is whether they realize there is a chance of not succeeding, an aspect AVIATION WEEK will examine in a later report.

▶**The Two R's**—In studying what the change in ALPA means, airline management will have to keep in mind two R's: Repudiation and 'Rithmetic.

Repudiation of Behncke as leader of the union did not mean repudiation of what Behncke has been demanding, or what he has been telling management.

IN HAPPIER DAYS, David L. Behncke sat down at the table with Clarence N. Sayen extreme right, during the American Airlines emergency board hearings. Between them is Henry Weiss, union attorney in the case. Left is AA pilot Fred Schwartz.

Special Report

What's behind the change in leadership of the Air Line Pilots Assn., and what does it mean? The airline industry and organized labor have been studying that question ever since early one July morning when David L. Behncke found he had been "recalled" from his presidency of the union. For answers AVIATION WEEK *sent a staff member to Chicago where he talked at length with ALPA's officials and employes, and obtained the only exclusive interview Behncke has granted on the intra-union dispute. The result is a special report, in three parts, the first of which examines what the change means to the airlines.*

It would be a mistake to read into Behncke's removal a "soft" bargaining policy from here on out. In fact, the policy is likely to be a good deal harder. It may seem gentler because it will lack Behncke's vocal vehemence and angry eyes. The impression of observers is that it is likely to be about as gentle as brass knuckles in a boxing glove; it may be pleasant to take, but as inevitable in its results as Ex-Lax.

The R for 'Rithmetic is symbolic of the new order of things in ALPA's relations with management, although it is not the only ingredient. The new breed of ALPA official is an economist, either by training or instinct—a breed Behncke cannot understand, and not understanding, cannot trust.

In the airlines' view, that has been one of the difficulties in dealing with Behncke on contract negotiations. More than once he has rejected out of hand airline statistics submitted for discussion while presenting no comparable figures of his own.

He prefers to demand submission to his terms, leaving it up to management how to comply—that's not his concern.

He prefers to pitch his arguments on safety, and make that a public issue by accusing the carriers of no interest in safety because they will not yield to the pilots' demands.

He prefers to dawdle for hours over the placing of a word or a comma—the phraseology must be precisely to his liking. This, too, is in character. He dislikes to commit any agreement to paper, but when he does, it must be in words of his own choosing. And he will dawdle for months, even years, over a contract.

Those are not the ways of Behncke's successor as head of ALPA, 32-year-old Clarence N. Sayen.

▶**Study in Contrasts**—An airline negotiator who has bargained with both Behncke and Sayen says he likes both men personally, despite their greatly different personalities and philosophies.

"Sayen has a better grasp of the operating aspects of an airline," he says, "and is more sympathetic, probably because he's still an active pilot—or

Move to Free ALPA Funds

Some of the tension in the intra-ALPA feud between David L. Behncke and the new group headed by Clarence N. Sayen was eased last week when attorneys for the opposing parties signed a stipulation that Robert G. Strait, union treasurer, can issue checks countersigned by both Behncke and Sayen. But neither would identify himself as president of the organization.

If the stipulation is observed by the principals, the union's funds in the bank again would be available. Current bills, reportedly including the payroll, have been paid in cash while the bank refused to honor Behncke's signature on checks. Sayen's group did not attempt to draw on the union funds.

In addition to making it easier for union operations to be conducted, the stipulation may quell, at least temporarily, talk of a receiver for the union (AVIATION WEEK July 30, p. 13).

The stipulation also provided that Behncke withdraw the two detectives he has had at union headquarters to prevent removal of any property by the new leadership.

In answer to the plea by eight directors for an injunction to restrain Behncke from interfering with the new officers, Behncke's attorney, I. Harvey Levinson, filed a cross-complaint for an injunction restraining the directors from interfering with Behncke as president, and asking damages from the eight directors of $200,000 for Behncke and $2 million for ALPA.

Further action before the court and before Master-in-Chancery Victor E. LaRue will be resumed today.

was until recently. Dave isn't as well up on the problems of today.

"I personally think Sayen will do a good job. He's terrifically bright, you know. He will approach a problem well-documented. Dave wouldn't do that. Before we go into negotiation we amass a lot of statistical data and put it on the blackboard to talk about. Dave wouldn't do that. Sayen would.

"That makes it easier to negotiate with Sayen. There's a common meeting ground in statistics. His boys will go over our figures and argue with some of them, say others are about right, maybe there's a dollar or two difference from their figures, but not enough to argue about.

"Dave is mighty particular about phraseology. Sayen isn't. He's more interested in principles."

This negotiator compared Sayen and his group with unions such as the Transport Workers.

"They are advocates of getting things done. They come in and know exactly what they want and we sit down and talk about that. And they don't go over ground that has been covered before and there's nothing there. They know what we can do and don't waste time asking for the other things. Dave isn't like that. He keeps bringing up the same things we have turned down before."

This is about as accurate a representation of Sayen and the ALPA "new way" of bargaining as you can get in this early period of the changed leadership. But it still doesn't give the full breadth and scope of the change, and it tends to be misleading in detail.

▶**The Weapon**—It is true that ALPA preparation for contract negotiation will rely more heavily then before on research and statistics—and the union's statistical and research department will be strengthened.

Statistics will be the chief weapon. Sayen doen't believe safety should be a public issue. He thinks management has as much at stake in safety as the pilots, and the pilots have as much at stake as management in not discouraging the public from riding the airlines. But he still will not hesitate to take a safety issue to the public if airline management is not responsive to what the pilots feel are reasonable requests.

It will not always be Sayen who will dominate the union's side of the table—as in the past, with rare exceptions, it was Behncke. The revolt of the pilots that ousted Behncke was a revolt against one-man rule, as will become apparent later in the series. The pilots intend to run their own organization, and they will start at the bargaining table. National headquarters will document their case, furnish trained negotiators to assist them, with Sayen appearing only when called in by the pilots.

▶**Familiar Bargainers**—It will be up to the pilots to carry the load. They know best their own airline and its problems, Sayen says. He and his associates will cite a case history, Eastern Air Lines. With one exception, EAL's pilots have always negotiated their own agreements. The exception was 1946, when Behncke took over the negotiations and they almost went to arbitration. "We haven't permitted him to negotiate for us since," says an EAL pilot, "and we've never had mediation."

In matters other than bargaining, the airlines will find they generally are dealing with their own pilots or always the same group of ALPA representatives. A basic creed of the new leadership is decentralization of responsibility. The working departments, such as grievances, engineering, and the others, will be down front on the stage rather than in a supporting role.

The pilots want quick action on contracts. They want to keep contracts

HAWKER'S LATEST AND FASTEST

First view of sleek, new Hawker P.1067 jet interceptor fighter powered by a Rolls-Royce Avon. The new fighter has been put through its initial flight tests and was ordered in quantity by the RAF from the drawing board. Points of interest include the large, high-pressure tires and the very big air intakes. The plane is believed to be fitted with an afterburner. A development of the P.1081, which was credited with speeds of over 650 mph., the P.1067 probably can exceed Mach I.

up-to-date (a desire management shares) so that changed conditions can be met promptly. They want one-year contracts. In the past, contract negotiations have lagged for years. The present United Air Lines case is an example. Bargaining began in September, 1949. The dragging-out of negotiations is another point the pilots make against Behncke.

His policy was to forestall agreement, press management to the breaking point, promote a crisis leading to confusion, negotiators familiar with his technique say. When the contract was finally put back together he hoped there would be a little more there than before the storm broke. It generally worked, too. But there is a grave question now whether it could work any longer. Behncke's policy led inevitably to government intercession—to which he was not averse. The new group wants to keep government out of bargaining; rightly or wrongly feeling the pilots have more to lose than to gain from government participation.

▶**A Child Is Born**—Dave Behncke is a man who lives to a great extent in a glorious and achievement-filled past. He remembers that government intercession won the pilots their first, and possibly greatest victory: Decision 83 of the National Labor Board in 1934.

It is odd that with his acute sense of history Behncke apparently has not realized the full import of Decision 83 and its subsequent incorporation in the Railway Labor Act. The most publicized aspect of Decision 83 in 1934 was its cut of pilot flying hours to 85 per month. But it also stated that pilots were not adequately compensated for increased mileage obtained with newer equipment. In clutching Decision 83 with its limitation on hours to his broad chest, Behncke also was fondling the baby that now has grown to be a strapping boy known as "mileage increase determination."

By reducing pilot flying hours, Decision 83 gave birth to new working conditions for pilots. If Behncke ever realized there was another baby in the same crib, he never gave signs. According to one long-time associate, Behncke flatly refused to ask for mileage increase determination in the first ALPA contract, signed with American Airlines in 1939.

Behncke perhaps can be pardoned for his failings in this respect, for he has not been alone. The Presidential board in the American case this year passed off the mileage issue; the airlines certainly haven't realized its history and how intensely the pilots have come to want mileage increase determination. Management would choose to talk about hours as the basic factor in pilots' working rules. The airlines apparently are having difficulty in understanding the pilots' tenacity.

▶**Reasonable Toughness** — That is where the airline negotiator quoted earlier may be wrong in putting Sayen and his staff in the same category as TWU. Sayen knows well that the airlines have refused to go along with the mileage increase determination theory. Some have even flatly refused to discuss it.

But still ALPA is not dropping that issue. In truth, it and on-duty time are the ALPA policies of the future. As will be reported in detail in a later installment, the pilots will increase allowable miles flown per month with faster equipment, not decrease the mileage. But they first must get agreement on the principle.

It will be pursued quietly, orderly and relentlessly. Sayen will be reasonable—and tough. His brown eyes will be placid, his full lips ready to smile; but his brain will be impatient of disgression or diversion. Mileage increase determination is the issue.

And it is ironic that Sayen, whose very name provokes Behncke to wrath, is credited with being the modernizer of the mileage formula, an issue that was seeded when Behncke wangled the terms of Decision 83 into the Railway Labor Act and Civil Aeronautics Act.

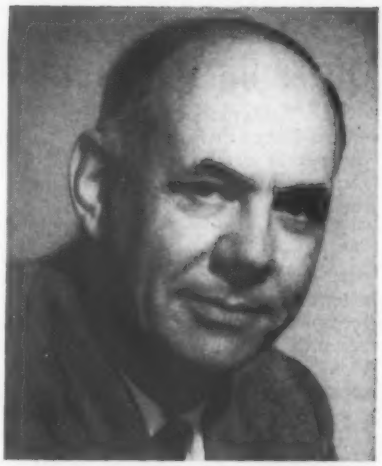
Next: The rupture within ALPA.

Boyer Acts to Break Engine Bottleneck

Harold R. (Bill) Boyer, newly named big boss of all aircraft production, promptly moved in to visit two major aircraft engine manufacturers last week to see what he could do about eliminating bottlenecks in that field.

He was sworn in by Defense Mobilizer Charles E. Wilson as Chairman of Defense Production Administration's Aircraft Production Board. Other members: Manly Fleischmann, National Production Authority; Delos Rentzel, Undersecretary of Commerce for Transportation; John D. Small, chairman, Munitions Board; Rear Adm. T. S. Combs, Navy, Chief of Bureau of Aeronautics; Lt. Gen. Orval R. Cook, USAF, Deputy Chief of Staff for Materiel; and Maj. Gen. John K. Christmas, Army, Chief Logistics Procurement.

Boyer, along with USAF's Assistant Secretary Roswell Gilpatrick and Gen. Cook, were to pay visits to the Pratt & Whitney Aircraft div. of United Aircraft and to Wright Aeronautical Corp. last week to get firsthand knowledge of production bottlenecks in engine manufacture. This week they travel to the West Coast for a firsthand visit to airframe manufacturers.



▶**Engine Problems**—"A major problem facing the aircraft engine manufacturers," Boyer said, "is the shortage of machine tools for jet engine production. Most machine tools in storage by USAF are not applicable to jet engines because of the comparatively recent development of the engines," he said.

Some problems of aircraft engine manufacture inevitably will be alleviated, Boyer said, with the integration of the mass production facilities of the auto manufacturers into the field. However, he pointed out, "auto assistance at the present time is limited to what may be accomplished through use of 15-30% of plant capacity."

"What this office is trying to do through our visits with aircraft and engine executives is to readjust our production schedules realistically . . .

"We are now approaching a realistic schedule, through establishment of this board, as to what can actually be accomplished," Boyer said.

▶**Alcoa Strike**—Touching on the Alcoa aluminum strike at Cleveland, Boyer declared that it has had a decided effect on airframe and engine manufacture "right across the board." More producers are needed, he said, and added that the board intended to do what it could to obtain additional construction of forging plants.

Engine production unfortunately is becoming unrealistic because of lagging machine tool delivery. Some machine tool schedules are three-to-six months behind schedules. This places engine deliveries behind schedule, and in turn causes complete airframe deliveries to fall behind, Boyer said.

Boyer is on six-months leave of absence from the General Motors Corp., where he is a director of production engineering. From 1930 to 1940 he was president and general manager of the Allen Corp., Detroit. Following this he was Chief of War Production Board's Aircraft Manufacturing Branch and in 1943 joined General Motors.

U.S. Ocean Carriers Differ on Mail Rates

U.S. international carriers have united forces in a drive to get a mail pay rate at least as high as Post Office Department pays their foreign competitors.

Although skeptical of the advisability of separating mail pay from subsidy over international routes and baring the extent of their government support to foreign competitors, U.S. carriers have accepted the inevitable—namely, that Congress is determined to make the separation—and have adjusted their strategy to it.

In testimony before Senate Interstate and Foreign Commerce Committee, there was a difference of opinion:

▶**Two Opinions**—Pan American Airways proposed that the universal postal union rate, now pegged at $2.86 a ton-mile for first class airmail, be flatly applied to all U.S. carriers;

But Trans World Airlines, Northwest Airlines and Braniff Airways urged that the UPU rate be the "floor."

Outlook for success of the carriers' drive is not too bright.

After hearing the evidence, Interstate's chairman, Sen. Edwin Johnson, handling separation legislation virtually single-handedly in the Senate, inclined to set the UPU rate as a "maximum," leaving Civil Aeronautics Board free to scale compensatory rates downward.

▶**Two Developments**—Two developments pointed to the prospect of less-than-UPU rates for most U.S. international carriers:

• CAB, which plans to set compensatory mail rates for international carriers by July 1, 1952, plans to gear these to cost-of-service, disregarding the UPU rates.

• A study made for Senate Interstate sets compensatory rates substantially below the UPU level, except for two operations: It set the compensatory rate for Panagra's South American operation at $3.19 a ton mile and for United Air Lines' Pacific operation at $2.87.

Other compensatory rates set by the study:

• Atlantic: PAA, $2.27; TWA, $2.13.

• Caribbean: Chicago and Southern, $1.63; Colonial, $2.46; Eastern, $2.38; National, $2.07.

• South America: Braniff, $1.75; Pan American, $2.38.

• Pacific: Northwest, $2.59; PAA, $2.44.

▶**Highlights of Testimony**—Here are some hearing excerpts:

• **TWA's chairman of the board,** Warren Lee Pierson, made these points against separation: "The revelation and publication of any amounts of subsidy assigned to our international air carriers is quite likely to hinder the State Department in negotiation of bilateral air transport agreements; it may even lead to requests by foreign governments for re-negotiation of some of the present agreements.

"Although we all know that the major foreign airlines are heavily subsidized, their governments do not reveal any accurate figures on the amount of subsidy. To publicize subsidy may lead the foreign governments to retaliation, and furnish the foreign airlines with ammunition for subsidy wars on the part of their governments".

• **PAA's president,** Juan Trippe: Since 1936, Maritime Commission has set UPU rates for the Merchant Marine; CAB should follow the same course with airlines.

• **Northwest's president,** Croil Hunter: "If separation is considered absolutely necessary, the least that should be done to protect U.S. flag carriers should be to provide that the service rate for carriage of mail shall not be less than the rate fixed by the UPU."

• **Braniff's executive vice president,** Charles Beard: Endorsing Hunter's position and opposing Trippe's position that the UPU rate should be applied to all carriers, he reported: "To do so will . . . result in increased revenues to the oldest and largest of our international operators and reduce to the strangulation point the pay to a number of the newer U.S. flag international airlines."

NEPTUNE'S NOSE CANNON

Deadly flexible twin 20mm. cannon turret installation in nose of Lockheed P2V-5 Neptune is pointed out by L. H. Height (right), P2V project engineer, to F. J. Fitzgerald, assistant engineer in charge of armament. The first of the new P2V-5s went into service with the Navy in April, others are going to Great Britain and Australia. Earlier P2Vs had a solid, pointed nose containing fixed armament.

Aircraft Forgings Roll As Alcoa Strike Ends

Aircraft engine and airframe manufacturers heaved a sigh of relief, which was echoed by Defense Department officials last week, as the strikebound Cleveland aluminum forgings plant of Aluminum Corp. of America reopened after eight weeks of shutdown.

The plant was the principal supplier of aluminum forgings for the aircraft industry (it supplied 75%). The strike over retroactive date of a 3-cents-an-hour pay increase began June 11 and involved approximately 3,000 employes.

Pressure to get the forgings rolling out again has been mounting steadily with the slackening of aircraft engine and plane production due to missing parts not received from Alcoa.

The negotiated settlement, agreed to by Walter P. Reuther, United Auto Workers president (CIO) and ratified by vote of the workers at a special meeting July 30, provided that the retroactive pay raise would be effective back to last Jan. 22 (the starting date of a new payroll period).

An Alcoa spokesman said the plant would begin operating last week as soon as some necessary maintenance work resulting from the shutdown could be completed. He said that the settlement was agreed to by the company in order to get production rolling again for both aircraft and tank components, but was not considered as a precedent-setting decision for any future wage agreement negotiations.

Adm. Robert B. Carney

Vice Adm. Richard L. Connolly

Five in Field for Navy Chief Post

Five top-ranking Navy admirals were discussed last week in Washington as the field from which a successor to the late Admiral Forrest P. Sherman as Chief of Naval Operations would be selected.

The field was well delineated unofficially when all five made a visit to President Truman in company with Navy Secretary Dan Kimball, following the funeral services for Adm. Sherman at Arlington Cemetery.

▶ **The Probables**—They are: Vice-Adm. Richard L. Connolly, (former four-star Admiral and Commander of the Atlantic Fleet, who reverted to three-star rank when assigned to the Naval War College presidency a year ago); and Admirals Arthur W. Radford, William M. Fechteler, Robert B. Carney and Lynde D. McCormick. Radford is Commander of the Pacific Fleet; Carney has been Commander of Naval Forces in the Eastern Atlantic and Mediterranean; Fechteler has been nominated for the post of Supreme Commander, Atlantic Sea Forces, North Atlantic Treaty Organization, and is currently Commander of the Atlantic Fleet, while McCormick has been Vice-Chief of Naval Operations since Sherman's death and acting chief pending the selection of a successor.

Joseph Short, White House press secretary, said that the President did not discuss the selection of a successor to Admiral Sherman during their ten-minute interview.

▶ **Battle Stations**—The new CNO will enter the Defense Dept. scene while a major internal battle looms as to balance between the services in the continuing expansion of the fighting forces in the defense program.

Air Force proponents want a 75% build-up over the 95-wing structure now building, while Navy is holding out for only a 10% buildup and a greater expansion of Naval aviation. Army, on the other hand, draws a line somewhere in between the two, but demands that a considerable portion of whatever build-up is authorized be given to tactical aviation needs.

The incoming Chief of Naval Operations will have a difficult time holding his own in the present battle for expansion.

▶ **Top Contenders**—The two top contenders for the high Navy post appear to be Adm. Carney and Vice Adm. Connolly.

Considerable speculation had been aroused that Adm. Fechteler would be the logical successor to the post. The Administration and Joint Chiefs of Staff indicated, however, for naval forces of the NATO group to be integrated in short order, Fechteler must be held for duty with the NATO Sea Forces Command.

Navy first choice for the post was reported to be Admiral Radford, but Air Force leaders consider him the Navy master-mind behind the B-36 investigation a year ago. As a result, Air Force is believed prepared to wage a last-ditch fight against his nomination.

▶ **Radford Senior**—In terms of seniority, Admiral Radford, 55, leads all five and is the only Naval aviator. Fechteler, 55, is second; Carney, 55, is 4th ranking officer; McCormick, 56, is 5th ranking officer while Connolly, 59, is 9th in seniority on the admirals' list.

Admiral McCormick might hold the job indefinitely as acting CNO. Sources close to McCormick, however, report that he does not want the job and that he does not feel physically up to it.

Dan Kimball, newly appointed Secretary of Navy, is said to favor Admiral Robert B. Carney and Vice Adm. Richard L. Connolly. Carney, who has been commander of the Naval Forces in the Eastern Atlantic and Mediterranean, has just been replaced by Rear Adm. Walter F. Boone. This leaves Carney open for a new billet and some Administration quarters report that he is held in high regard by the Administration and would be acceptable to the Air Force.

▶ **Connolly Outsider**—Vice Admiral Connolly is the dark horse in the race. Admiral Chester M. Nimitz, World War II Navy boss and a personal adviser to President Truman on Navy matters, is a close friend of Connolly's. Nimitz is said to be backing Connolly.

A-Power for Planes, Subs Progressing

Atomic Energy Commission last week disclosed that continued progress is being made toward developing atom-powered aircraft and submarines, but that the progress on submarines is farther advanced.

Dr. Lawrence Hafstad, head of AEC's reactor division said the atomic-powered aircraft is "very much behind" the atomic-powered submarine. One atomic sub engine is reported well under construction and design of a second is far advanced.

Actual development of an atomic aircraft engine by General Electric Co. has advanced and the "theoretical feasibility of nuclear-powered flight is definitely established," it was stated.

Four-Fold Rise Asked In Tools for Planes

Four-fold expansion of the machine tool industry, to step up U. S. production capacity to a rate of 50,000 planes a year by 1953 is called for by Defense Mobilization Director Charles E. Wilson.

Wilson said that complementing the plane production capacity he wanted ability to make about 18,000 jet engines a month.

A recent directive from Wilson provides for assuring higher prices to the machine tool industry, help in getting manpower and materials, and advance payment on orders to permit financing contracts. These are expected to get a step-up in the operating rate from $670 million a year, currently to about $2.9 billion a year by next July.

However, Frederick S. Blackall, vice president of the National Machine Tool Builders Assn. last week took sharp exception to a regulation of the Office of Price Stabilization, aimed at implementing the ODM directive. He called the regulation "a blatantly transparent mechanism for the control of profit, a dangerous excursion into socialistic philosophy."

FINANCIAL

Forced Sales as Money-Makers

W. R. Grace's profitable experience in divestment of NAL and Eastern shares is matched by other firms.

Forced sale of airline stock holdings by direct or indirect compulsion has thus far proved to be a profitable procedure by the divesting groups. The latest example is afforded in the recent sale by W. R. Grace & Co. of its former holdings of National Airlines stock.

At present, W. R. Grace & Co. is in a bitter struggle for direct entry to the United States via an interchange with National for Pan American-Grace (Panagra) which it owns jointly with Pan American World Airways. Pan American is objecting and is presumed to have prodded the Civil Aeronautics Board to initiate an investigation of W. R. Grace & Co.'s holdings of National Airlines stock. Apparently to avoid a showdown on this inquiry, W. R. Grace has sold its National stock. But it has been profitable for the Grace interests to do so.

▶**To the Rescue**—In March, 1949, when National was experiencing financial difficulties, W. R. Grace & Co. bought 174,000 shares, or 17.4 percent, of the airline's stock at $5.50 per share. An additional 172,000 shares were placed under option to the same group. Soon thereafter, National offered to sell 346,000 shares to Pan American at about the same price. The proposed additional sales were contingent upon an equipment interchange agreement between Pan American, Panagra and National at the New York and Miami gateways. Early this year, National repudiated the equipment interchange proposal and in the process the stock options were torpedoed as well.

In the meantime, new alignments among all interested carriers in the Miami gateway area have appeared.

In selling its National Airlines stock after almost two and a half years ownership, W. R. Grace & Co. is estimated to have realized a capital gain of better than 170%. In other words, an original investment of about $957,000 resulted in a capital gain profit of about $1,653,000.

Early in 1949, when the Grace interests acquired their National holdings, to avoid working at cross purposes they sold 70,000 shares of Eastern to complete liquidation of their one-time 80,000-share investment in that airline. This sale, too, was accomplished at a substantial profit, estimated to represent at least about a 200% capital gain on an original investment of around $400,000.

It would be ironical if W. R. Grace & Co. now found it desirable to become an investor once again in Eastern if subsequent equipment interchange arrangements concerning Panagra made such a commitment desirable.

▶**PAA Divestment**—Pan American too has benefited by a divestment made necessary in another direction. During 1945, the Chinese Nationalist Government dictated a policy of greater ownership and control of its airline in which Pan American then had a 45% interest. Pan American sold its entire interest in the old China National Aviation Corp. for a book profit of $4,811,311. At the same time, it invested $1,675,577 for a 20% interest in the new China National Aviation Corp.

With the onrush of the Communists in 1949, Pan American sold its 20% participation to CNAC at a 21% loss, realizing $1,250,000. This loss of about $425,000 was offset almost ten-fold by the 1945 profit in the sale of the Chinese airline interest in 1945.

▶**Steamship Pressure**—CAB policy has consistently discouraged controlling interests in certificated airlines by steamship interests. This was largely responsible for the sale by American Export Lines of its majority interest in American Export Lines (later American Overseas Airline) to American Airlines in July, 1945.

While American Export was forced to move out of a dominating position in the trans-Atlantic air field, it did so at considerable profit to itself. At Dec. 31, 1944, American Export showed its holdings of 176,000 shares of American Export Airlines stock at a valuation of $1,859,123. It sold 120,000 of these shares to American Airlines for $3 million in cash, retaining 56,000 shares, or about 24%, of the overseas air carrier's stock. American Export's holdings were subsequently increased to 355,708 shares through a three-for-one stock split in July, 1946, plus the purchase of 187,708 additional shares at $12 a share after the stock split.

The total residual shares were carried on American Export's books at $2,602,496. When AOA was sold to Pan American, a capital gain of some $944,000 was realized in the process by American Export. In other words, the founder of AOA realized a capital profit of at least $3,594,000, or about 200% on an original investment of $1,859,123. But this was not all. In 1939, when American Export owned 100% of American Export Airlines, it distributed to its shareholders as a stock dividend 30% of its airline holdings. This distribution must be included in the overall computation of the gains realized by the airline venture.

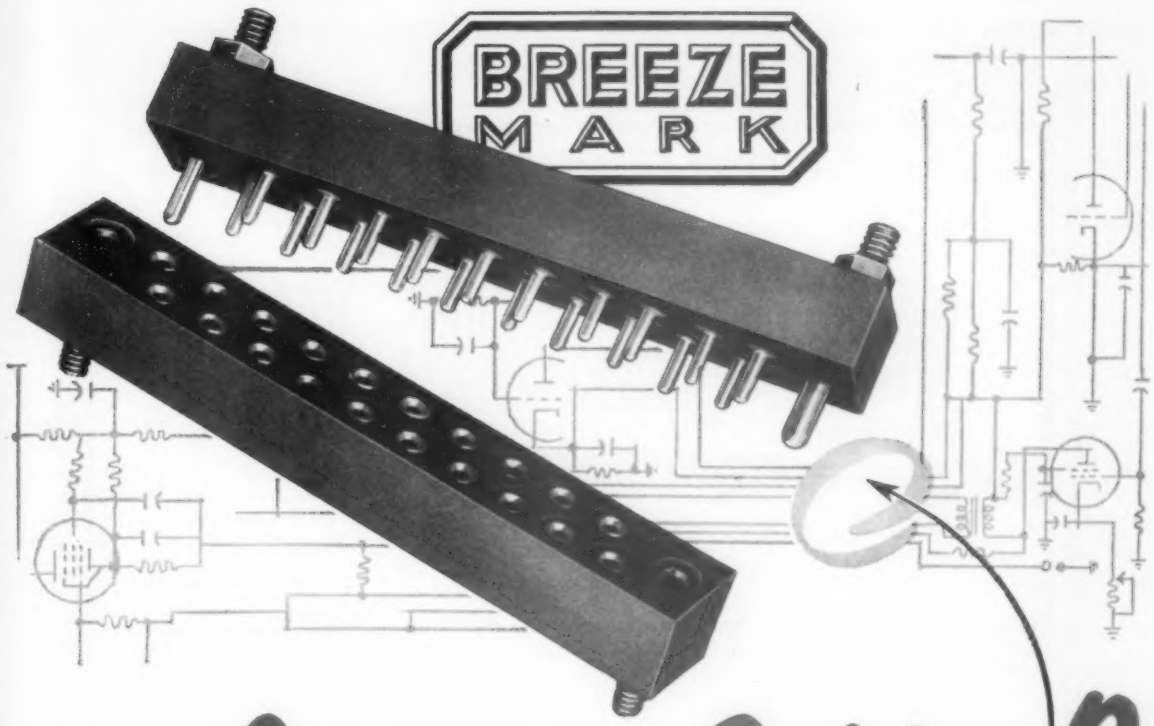
▶**Avco's Experience**—Probably the most profitable forced divestment belongs to the Aviation Corp. (now Avco Manufacturing Corp.). In October, 1945, CAB ordered the holding company to sell down to at least 4% its then 22% interest in American Airlines common stock. This order could not have been issued at a more opportune time to benefit the Aviation Corp. In October, 1946, 211,000 shares of the old stock were sold at what now appears to have been near peak prices, for a profit, before taxes, of almost $17 million, or almost seventeen-fold on an investment carried on the books for slightly more than $1 million. This left the holding company with 257,690 shares of American (after the five-for-one split) which it sold in June, 1951, at a gross profit of more than $3.5 million on an investment last carried on its books at $322,122.

In recent years, Avco also liquidated its aviation investments in Pan American, Roosevelt Field, and Convair. While these sales, on balance were very profitable, they were largely done on a voluntary basis. Moreover, the degree of profits obtained in their disposal does not approach that realized in the American Airlines transactions.

▶**Matson Loss**—Not all airline divestments or commitments by other transportation interests have been profitable. For example, for many years the Matson Navigation Company, a potent steamship operator on the Pacific with a known net worth in excess of $65 million, has attempted to become a factor in air transportation in that area. After repeated attempts for a trans-Pacific certificate, the Matson group decided to liquidate its aviation aspirations at a substantial loss after making an original investment of over $2 million.

The Waterman Steamship Corp., in July 1946, filed an application with its affiliate, Waterman Airlines, Inc., organized in 1940, for a certificate to operate between New Orleans and San Juan, P. R. Despite an airline investment of about $1.5 million, this application was denied by CAB. Persisting in its desire to obtain a position in air transportation, Waterman subsequently acquired a majority interest in TACA. Its investment in this airline is known to have exceeded $2 million, with no profits, but heavy deficits thus far.

—Selig Altschul



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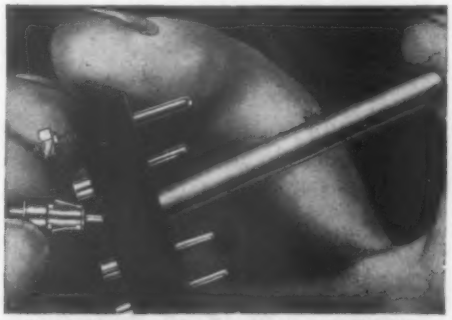

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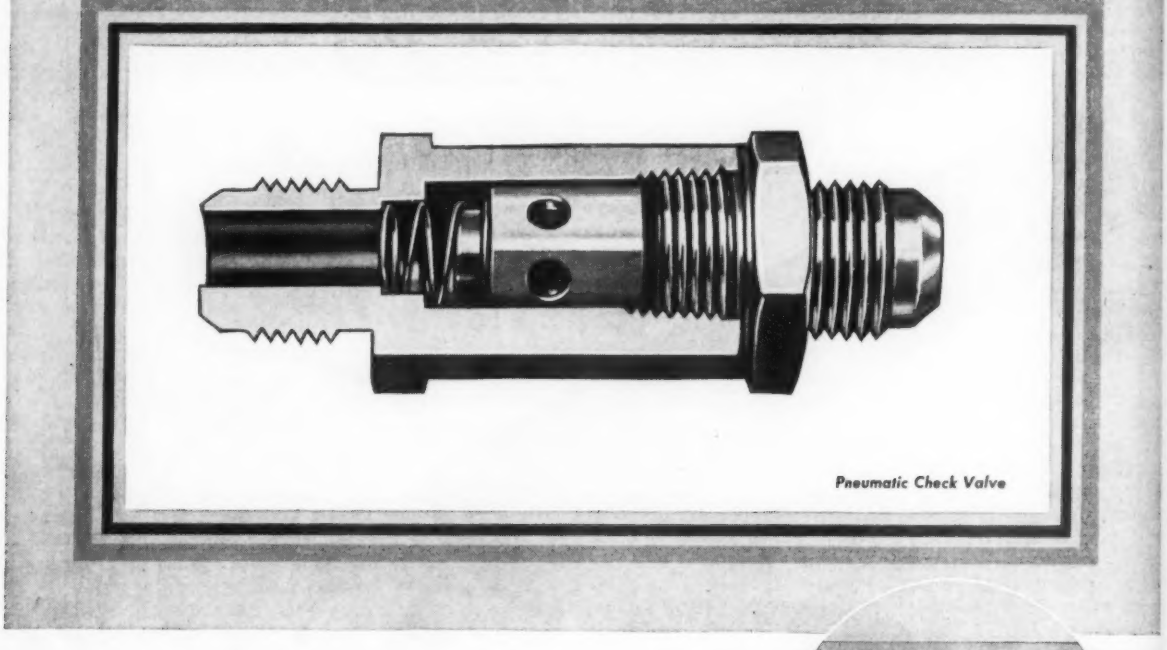

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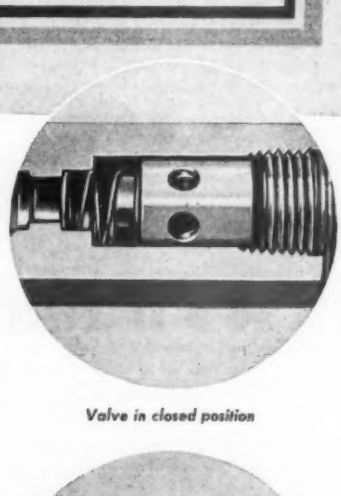
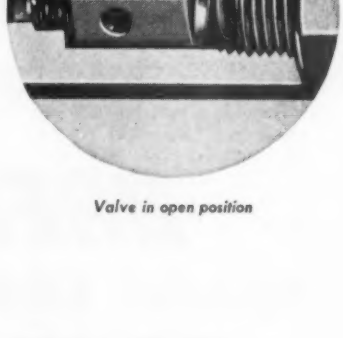


Valve in closed position



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'Bug-Hunting' on the Avro Orenda Jet

Perfecting a 'simple' modern turbine engine has its headaches.

In the past four years there has been a constant progression of new turbojet engines. But this has been coupled with a lack of disclosure of makeup details and development difficulties.

Probably the frankest evaluation of development problems with a modern jet engine was given recently for A. V. Roe Canada Ltd.'s Orenda, by D. W. Knowles, the company's Gas Turbine division chief development engineer, before the recent semi-annual meeting of the American Society of Mechanical Engineers, at Toronto. The discussion highlights the headaches involved in ferreting out "bugs" and bringing a "simple" jet to a high stage of perfection.

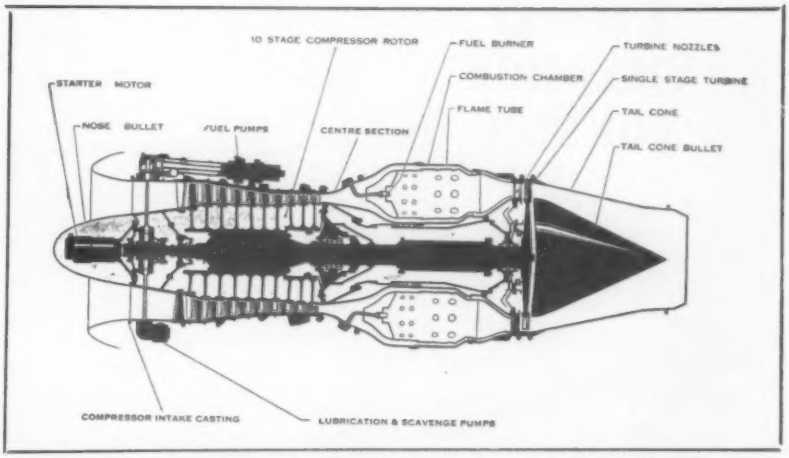
The Orenda, officially rated "in excess of 6,000 lb. thrust" (but probably putting out at least 7,000 lb.), now is being installed in Avro's CF-100 all-weather fighter, and also is slated for Canadair Ltd.'s version of the Sabre.

It is an axial-flow unit incorporating 10 compressor stages, 6 combustion cans and a single turbine wheel. Nominal diameter is 42 in., length about 10 ft., dry weight approximately 2,500 lb. Specific fuel consumption is about 1 lb./hr./lb.

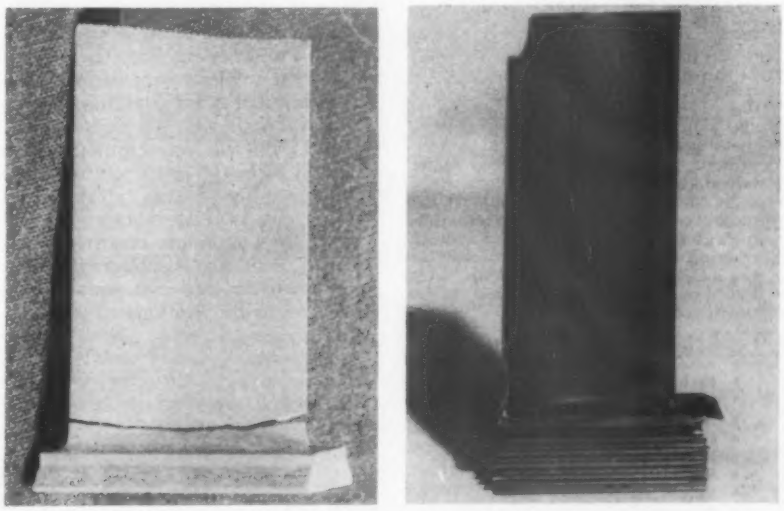
▶**Compressor Details**—First nine stages of the compressor rotor are carried on aluminum alloy disks, while tenth stage disk is steel. First three stages of blades are fir-treed to disks, dovetail fittings being used for the others. The first three and the tenth blade stages are steel, others are aluminum alloy. A stepped sealing ring projecting from the rear of the tenth stage disk into a gland on the center casting passes a small amount of air to cool the turbine disk's rear face. Front face is cooled by fifth stage air.

Stator blades are dovetailed in rings retained by lips on interstage spacers bolted to the casing. Bleed is taken from the second, fifth and eighth stages.

▶**Center, Cans, Turbine**—Center section houses the diffusers and the center bearing assembly, which retains the rotor axially and absorbs its thrust. This bearing comprises two units separated by spacer rings which permit the two to share the load. The bearing housing is spherically ground on its outer diameter to accommodate main shaft angular misalignment in maneuvers. The bearing housing is spring-loaded against a rubber thrust-ring which deforms slightly with misalignment but maintains the axial position of the rotor.



AVRO CANADA ORENDA turbojet sectional view shows interior details.



FATIGUE CRACK in stator blade (left); cracked turbine blade tip (right).

The six cans are arranged around a light alloy casting—the backbone—which joins the center casting and the turbine nozzle box. Ignitors consisting of a small fuel atomizing nozzle and spark-plug are mounted on two of the cross-fire tubes, and atomizing burners carried on the diffuser-duct pads project into the cans.

The nozzle box carries the turbine nozzle blades and the transition ducts from the cans. Attached to the box is the shroud ring surrounding the turbine blades. As in conventional applications, the turbine disk has an integral stub shaft which carries the turbine bearing (cooled by second stage air) and connects to the compressor shaft through a splined coupling near the center bearing. The nickel-chromium alloy turbine blades have fir tree fixings.

▶**Fuel Control, Lubrication**—Throttle is connected to an altitude-sensitive, scheduling-type flow control which varies the delivery of two engine-driven pumps through a servo-system to maintain engine speed constant for any throttle setting regardless of altitude. Pumps have integral overspeed governors.

Oil pump supplies lube to rotor bear-

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▶ **Development Hurdles**—Avro Canada's Knowles starts with the engine's proving stage and give a revealing analysis of some of the major troubles encountered.

Early development running showed that:

- Predicted thrust was obtained with design speed and jet pipe temperature.
- Starting was excellent.
- Acceleration was reasonable.
- Oil consumption was very high.
- Tenth stage stator blades showed "a regrettable tendency" to come off in quantities.
- Turbine blades developed tip cracks near the trailing edge.
- The engine showed a slight instability in the region of 70% full speed, but this did not limit test bed running.

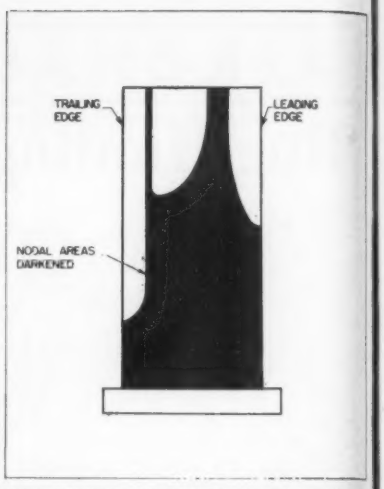
▶ **Oil Problem**—Tackling the oil consumption problem, Avro engineers carefully adjusted bearing oil flows, cooling air flows and air flow to pressurized glands. But oil consumption still remained high. Oil loss finally was traced to the turbine bearing area. Various sump and scavenge arrangements and new seals and flinger rings were tried. Finally, very precise calibration showed that scavenge flow was equal to that supplied to the bearing.

The only clue seemed to be that oil loss was small at low speeds or until the engine had been running for some time. The rear bearing assembly operated with negligible loss on a test rig.

Only difference between the rig and engine conditions was the relative temperature of the components and it was then discovered that a steel sleeve supporting the bearing (an interference fit in an aluminum casting), was not sealing one of the oil drillings in the casting. The casting had a greater thermal expansion than had been anticipated, and under operating conditions was relieving the interference fit, frequently permitting oil to escape. The end of the oil drilling was plugged and subsequent tests showed that the problem was solved.

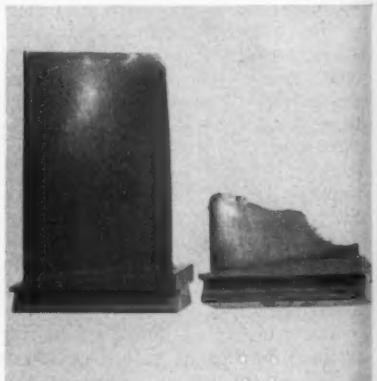
▶ **Stator Cracks**—Failure of the tenth stage stator blades first were traced to fatigue cracks resulting from intercrystalline corrosion. Other blades also were subject to this corrosion. Material for the compressor's later stages was changed to a similar but more corrosion-resistant metal, but the failures continued—not as frequently, but appearing as ordinary fatigue cracks.

A resonance study showed that the stator blades were being excited by the tenth rotor in the second flexural mode. After strain gage tests, a switch was



VIBRATION PATTERN of turbine blade. Resonant vibrations may cause failure.

CENTER BEARING thrust ring failure.



FATIGUE CRACK (left blade, lower right corner) leads to rotor blade failure.

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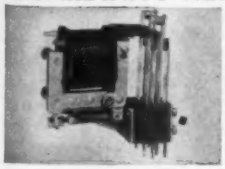

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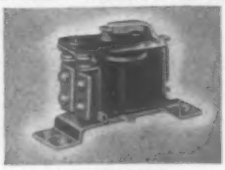

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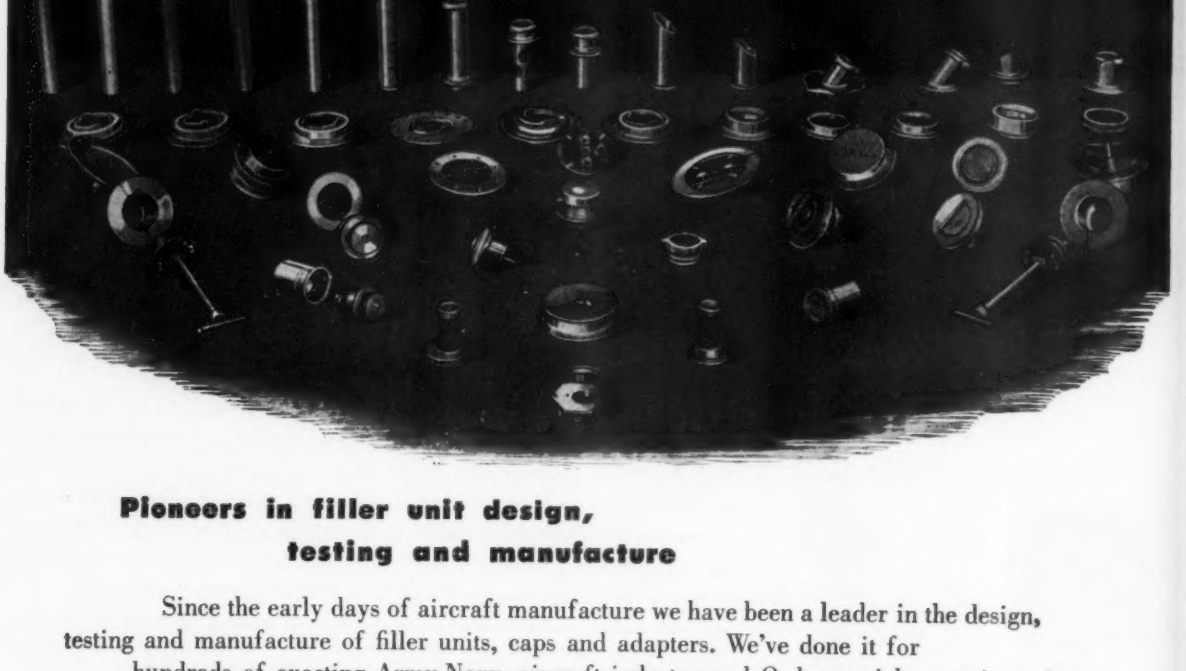

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made to steel units and this cleared the trouble.

▸**Turbine Blade Cracks**—Knowles reports that, as originally designed, the turbine blade had a feather edge to prevent serious damage in case of tip rubs which might occur because of the small clearances used. A survey of the nodal patterns of the vibration modes in the running range showed that the second complex mode had an area of high bending stress extending to the tip.

Cracks started in the thin feather-edge and were propagated along the line of high stress. As the behavior of turbine shroud ring under operating conditions was established, it was possible to employ satisfactory tip clearances without danger of rubs.

Since the need for the feather edge had disappeared, it was eliminated to strengthen the blade tip. This proved an effective remedy.

▸**Stage Seal Rubbing**—As more running hours were accumulated, further difficulties began to crop up. Almost all engines were inclined to heavy rubbing of the tenth stage peripheral seal, with complete loss of its effectiveness.

This was believed to happen on running down from high speeds when the pressure behind the tenth stage disk decreased rapidly but a high pressure could remain momentarily between the ninth and tenth disks, causing the latter to flex and the stepped sealing ring to foul its gland. The interstage cavity was vented through the tenth stage disk and this cured the trouble.

▸**Thrust Ring Difficulty**—Considerable work was involved in the development of the flexible thrust ring of the center bearing assembly, incorporated to look after angular misalignment resulting from flight maneuvers.

As originally designed the rings were of soft rubber with slotted steel corner braces. They suffered considerably from extrusion of the rubber around the edges of the corner braces, through the slots in the corner braces and from the unbraced corners.

The resulting collapse of the ring permitted the compressor to move forward and foul the stator assembly. This was partially remedied by placing a strip of tape between the corner brace and the rubber. A further variation consisted of binding the ring with nylon tape. But it was difficult to cure the ring to the required dimensions even under pressure, because the tape binding tended to make the ring oval after curing. Under operating conditions the ring would assume the rectangular shape intended with reduction of its axial dimension ,and compressor fouling could still occur.

The problem was finally solved by using a composite ring with a hard exterior and soft core without binding.

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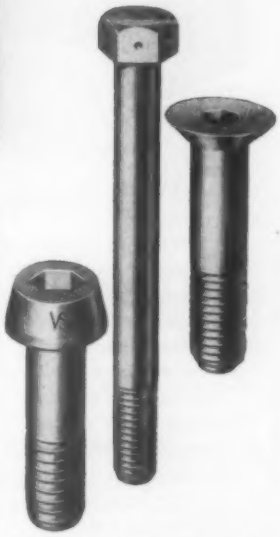

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which did not alter dimensionally during operation.

► **Bearing Seal Troubles**—Knowles says that the front bearing seal went through several stages of development to produce a satisfactory design. The seal is put behind the front bearing of the compressor rotor to prevent lubricant from escaping into the cavity immediately in front of the first rotor disks. This space is at a negative pressure of 1.5-2 psi. because it is connected to the compressor air passage ahead of the first stage rotors. The bearing area is at atmospheric pressure.

Original seal was a carbon ring held in place against a cast iron rubbing surface by a single helical spring with a pressurized gland on the shaft as a further seal. This arrangement did not work well because the single helical spring did not bear evenly on the carbon ring. The result was uneven, heavy wear of the sealing surfaces.

A carbon ring seal was then used, supported by a multiplicity of small springs. At this time it was decided to eliminate the gland as an unnecessary complication. The new seal worked well on rig tests but was erratic on the engine. It was thought that the differential thermal expansion of the rotor and stator casing was causing the trouble by permitting the sealing surfaces to move apart. This was checked by introducing wear plugs near the seal which showed that little differential expansion was taking place.

When this was established a large number of seals were examined and it was discovered that the spring rate and travel of seals as supplied varied considerably from specification. When these were brought under closer control the trouble disappeared.

► **Vibration Problems**—Knowles relates that one of the more difficult problems did not become apparent until almost after a year of testing, engines having then logged about 2,000 hr.: A single seventh stage rotor failed, followed by several more within a short period, some on engines with relatively few hours of running. Thereafter, failures continued to occur in apparently random fashion.

These failures appeared as fatigue cracks, the result of the high vibratory stresses induced in the blade by the coincidence of one of the natural frequencies of the blade with an exciting force such as that caused by the passage of the blade through the wakes of the preceding row of blades.

Because the failures were somewhat sporadic and since there was a great spread between the lengths of running time which produced them, it was suspected that the material might be at fault. A survey was made of the physical properties of the batches of material from which the failed blades had been made and these were compared with the properties of batches which did not produce any failures. This gave little information.

Since the experimental engines had been used for a variety of tests, a survey of the running history of all engines was made by plotting the operating time in each 100-rpm. speed range. It was not possible to draw any conclusions from a comparison of histories of engines which had failed blades and those which had not.

The study was narrowed to a comparison of histories 10-, 5- and 1-hr. prior to failure to establish speed ranges which caused failure. This also proved of no value.

► **Failures Not Isolated**—As more failures occurred they were tentatively identified from the nodal pattern surveys as being caused by either second torsional mode or the first complex mode, both of which occurred within the running range, but it was still not possible to explain how some engines could run several hundred hours without failure and others would fail in less than one hundred hours, even when the known scatter of the endurance properties of the material was taken into account.

Without result, failed blades were carefully examined for manufacturing flaws and inconsistencies, such as varia-

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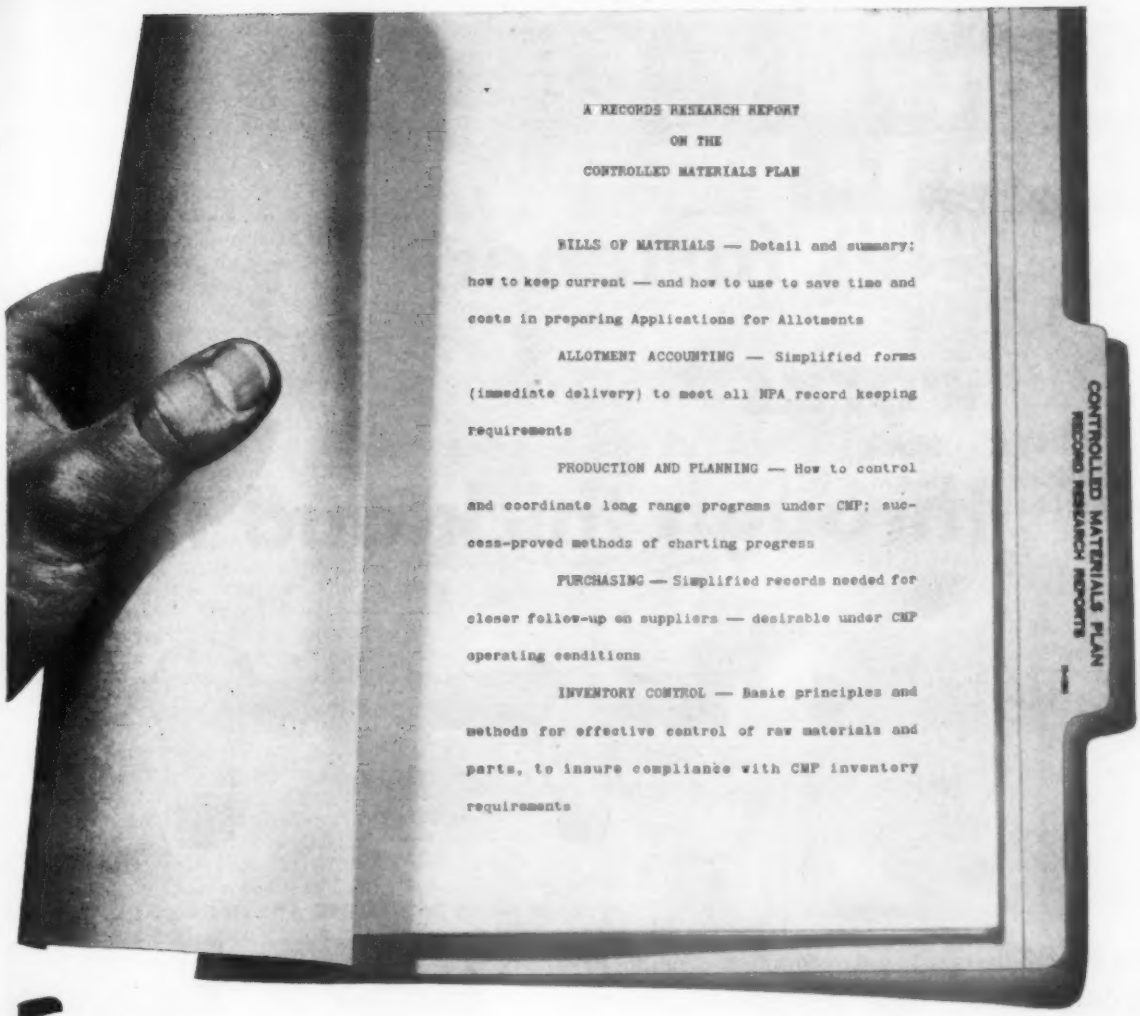
A RECORDS RESEARCH REPORT
ON THE
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Spring-Lock—the easy-to-use removable fastener for modern designs—works whether panel thicknesses run over or under specifications! Spring wire deflects automatically to handle greater or lesser thicknesses. Spring-Lock's design flexibility makes it more than a fastener: it can be adapted as a shelf support, door strike, knob or any similar panel-mounted device. Many standard shapes and sizes of Simmons Spring-Locks are available from stock.

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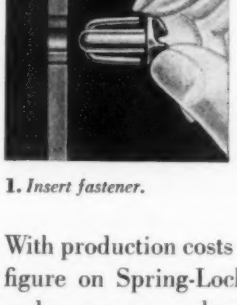
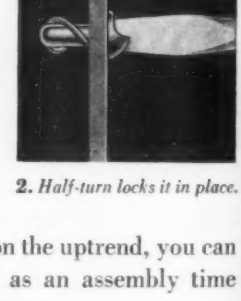
Spring-Lock · Quick-Lock · Roto-Lock

HERE'S HOW SPRING-LOCK WORKS



1. *Insert fastener.*



2. *Half-turn locks it in place.*

With production costs on the uptrend, you can figure on Spring-Lock as an assembly time and money-saver, because:

- **Installation is BLIND**
- **Installation is EASY: no special tools are needed**
- **Installation is QUICK: a half-turn locks it in place**
- **Installation is SECURE: the *spring* steel *locks* the fastener, resists vibration**

Send for details and samples, or write us about *your* fastening problem.

tions in thickness and trailing edge radius.

As soon as it was apparent that the failures were not isolated ones a strain-gage study was employed. This involved the development of a slip-ring unit to transmit the minute signals from the rotor at high speeds, without electrical distortion. Several months of lab work and engine testing were required before an adequate slip ring unit, proper instrumentation and reliable wiring methods were established. It was then possible to determine the relative magnitudes of the stresses in the various resonances and also the width of the resonance bands.

At the same time the problem was being attacked using other methods by running engines to a test schedule consisting of equal operating periods at 25-rpm. speed increments, with frequent inspection of the blades through viewing ports in the compressor casing to determine the speed range in which failures occurred and the length of time required at speed to produce failures.

▶ **Blade Changes**—The strain gage tests and engine running confirmed that both suspected resonances were contributing to the trouble and established a speed range which had to be avoided to prevent fractures, until a redesigned blade could be made and proven. As capacity for manufacturing new blade designs was already strained, several interim solutions were tried using the existing blades. These reduced the incidence of failure considerably.

The first was a change in the number of stator blades preceding the rotors in which failures were occurring. The sixth and seventh stators originally had equal numbers of blades in each row. It was thought that this might be causing trouble because both the leading and trailing edges of the blade would receive impulses at the same time, thus increasing the coupling of the exciting force. The number of blades in the sixth stator row was increased 10 percent to correct this condition and to move the resonance speed away from the cruising speed range.

Results of this change were beneficial so far as the seventh rotor blades were concerned. However, it had the effect of causing eighth stage rotor failures after long operating periods.

▶ **Indexing Effect**—The second interim solution was introduced when it was determined that the relative indexing of the seventh rotor row to the preceding rotor rows had an appreciable effect on blade life. As originally built the relative positions of the blades in the various rotor stages was quite random. During the special engine tests, one engine ran for several hundred hours without failure while another failed blades consistently with a few hours of running. Both engines were carefully examined for component variations, the only apparent difference being the indexing of the rotor blades.

When the method of blade indexing was reversed on the two engines their blade-breaking characteristics were reversed. This largely explained the wide variations in running time to failure. The favorable indexing was then adopted as standard for all engines. Further studies with controlled indexing variations are now proceeding, using strain gages to get quantitative information to guide future work.

The final solution of blade vibration problems requires, says Knowles, that one of the following courses should be adopted:

- **Damping action** of the blade root should be increased sufficiently to prevent the blade from being overstressed.
- **Blade should be strengthened** to be able to withstand the vibratory stresses.
- **Blade should be redesigned,** or the exciting frequency altered so that the natural frequency of the blade does not coincide with the troublesome exciting frequency within the engine operating range—the method adopted as the solution for this particular problem.

▶ **Instability Solution**—Knowles reports that the engine went through a distinct change of note at about 60% of full speed, the condition being associated with the unstalling of the early compressor stages.

The slight instability evidenced at 70% full speed indicated that the engine was operating close to the surge point at this speed. Hence, Avro technicians weren't surprised when the engine showed a tendency to surge during rapid accelerations. It was known that this would cause more trouble at altitude; therefore a study of compressor characteristics was carried out on the compressor rig and verified on the test bed.

This revealed a mismatching between early and later stages of the compressor. Similar trouble had been encountered with the Chinook (an earlier, developmental engine) where it was associated with very low outlet velocities at the tip of the first stage rotor. When temperature and pressure traverses were done on the Orenda, it confirmed that the situation was similar. A satisfactory solution had been worked out for the Chinook on a two-stage compressor test rig, the pressure ratio on the first stage being increased by restaggering the inlet guide vanes and the first rotors.

Because this was easy to do, it was tried on the Orenda. This did give better matching, but since the relative air velocities were higher with the Orenda and the restaggering gave an increased angle of incidence on the rotor blades, compressor efficiency was lower, with a serious loss of engine performance.

The first two stages of the engine

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"THE STEEL INDUSTRY is currently operating at more than 100% of rated capacity—turning out well over 2 million tons of steel per week. This record high production—every ton of which is in urgent demand—cannot be kept up unless we get more scrap from every potential source. For without your scrap we cannot produce enough steel. Today, every ton of steel turned out requires a half a ton of scrap for its production. That's why scrap—more scrap—is so urgently needed, and needed right away.

"The fact we have to face today is that steel mills are operating on a hand-to-mouth basis as far as scrap is concerned. Some mills are working on only a two-day supply of scrap. We already have had to shut down steel-making furnaces for lack of scrap.

"That's why we are asking you to strain every effort to get more scrap out of your plants and yards and on its way to the mills . . . to search out the scrap that doesn't come to market in normal times. You'll find this "dormant" scrap in obsolete equipment, tools and machinery that you haven't used for years . . . overlooked in your storage sheds . . . or rusting away in a junk pile in some forgotten corner. It's there. Turn it in at once—*so we can turn out the steel you need.* We can't do it without your help."

B F Fairless

President, United States Steel Corporation

USS

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UNITED STATES STEEL

were then redesigned, using radial equilibrium principles to get a better velocity distribution. This improved the matching of the front and back stages considerably. Consequently, the acceleration characteristics were improved greatly.

The original design had a splitter vane located in the diffusers, to improve the velocity distribution to the combustion cans. It is known that a poor velocity profile can lead to serious buckling in cans. Considerable difficulty was experienced in designing an aerodynamically acceptable splitter which did not fatigue fail because of buffeting from the air stream. Hence, this feature was eliminated. Although some combustion chambers have failed from buckling, it was only after very long periods of operation, and this is not considered to be a limitation on the engine.

Windshields Studied To Analyze Failures

Laminated windshields are coming in for close study at the Illinois Institute of Technology's Armour Research Foundation.

Aim of the investigation, sponsored by the Air Research and Development Board, is to perfect an electrically heated, ice-free, failure-proof windscreen coupled with an efficient mounting method in aircraft. Out of the research will come specifications for the design of windshields—standard and bullet-proof—for military planes.

The foundation has compiled data on conditions to which a windshield will be subjected in dry air, clouds, and on the ground in sub-zero temperatures, and it has conducted theoretical studies and lab tests for stress analysis.

In one test, alcohol at —90F was run over one side of the screen, while heat was applied gradually to the other side until breakage, to determine effect of temperature differences.

Physical properties of the glass and the bonding plastic also have been evaluated.

Researchers also found that cold-soaking while on the ground may cause the glass to fail. At normal temperatures the bonding plastic (polyvinyl butyral) is elastic, hence a good backing for the more brittle glass. But at low temperatures, the material contracts and stiffens and may crack the glass.

Another problem is created when the cold, outer mounting of the windshield draws off heat, creating a hot spot in the center of the pane. This condition may also cause failure. Heating the mount may be a solution to this problem.

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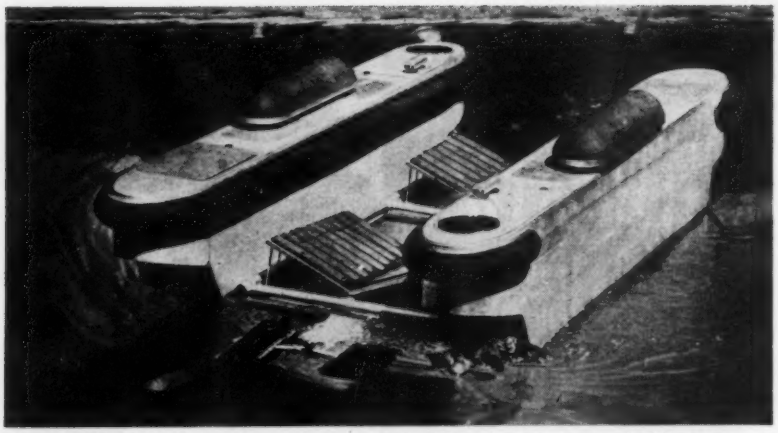
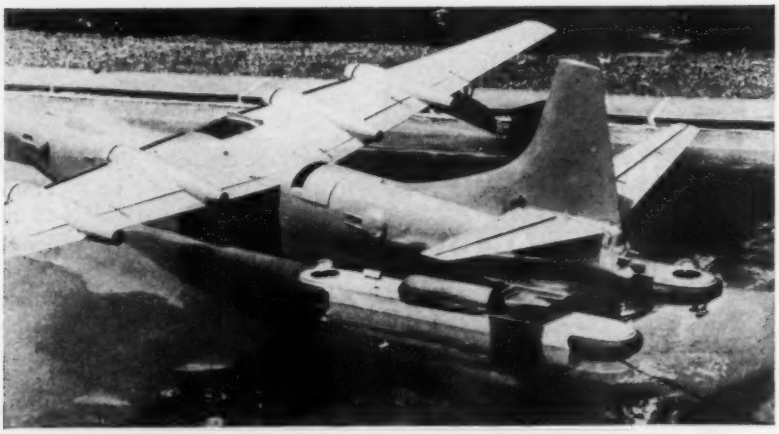
Boat Beacher

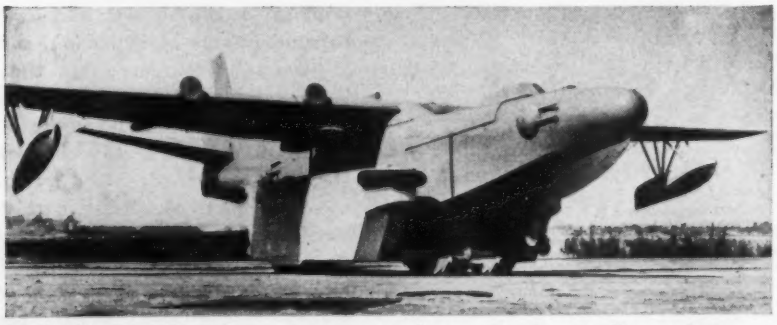
Self-propelled Edo gear goes after flying boat and brings it to shore.



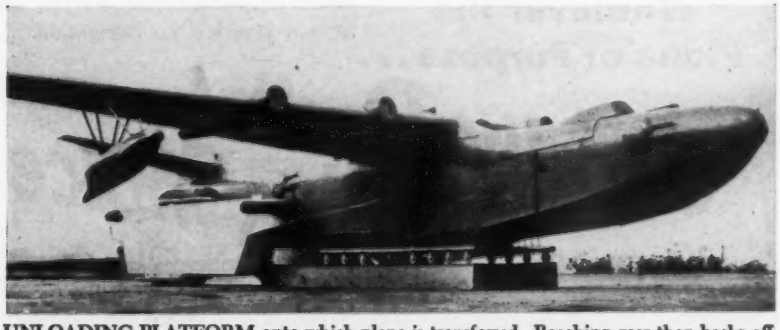
DRYDOCK MODEL has fore and aft control stations for steering vertical floats to . . .



FLYING BOAT STERN. Pneumatic cushions rise to support plane underwing before . . .



BEACHING GEAR climbs up on shore, traveling on tricycle caterpillar treads to . . .



UNLOADING PLATFORM onto which plane is transferred. Beaching gear then backs off.

A new solution to the problem of beaching a large flying boat has been designed and developed for the United States Navy by the Edo Corp., College Point, L. I., N. Y.

The new gear, designated Model 144, looks like something off the front cover of a science-fiction magazine. It is amphibious and self-propelled, with huge pneumatic cushions and transparent hemispherical control blisters breaking the angular lines and planes of the structure.

Model 144 was developed as the result of research on simplifying the handling of large flying boats. This research indicated that a new kind of beaching gear was needed—a gear which would be usable without prepared ramps, without special structure in the plane, and which would involve minimum time and manpower.

►**Floating Drydock**—Model 144 consists of two vertical flotation units spaced far enough apart to accommodate the hull of a large flying boat. Between these units is a horizontal platform with a removable pallet with adjustable pillows on which the hull bottom rests.

The beaching gear is propelled by two engines of 150 hp. each. These drive two propellers, located one at each end of a diagonal across the flotation units. Props are rotatable through 360 deg., which permits proceeding in any direction or turning on the axis of the unit.

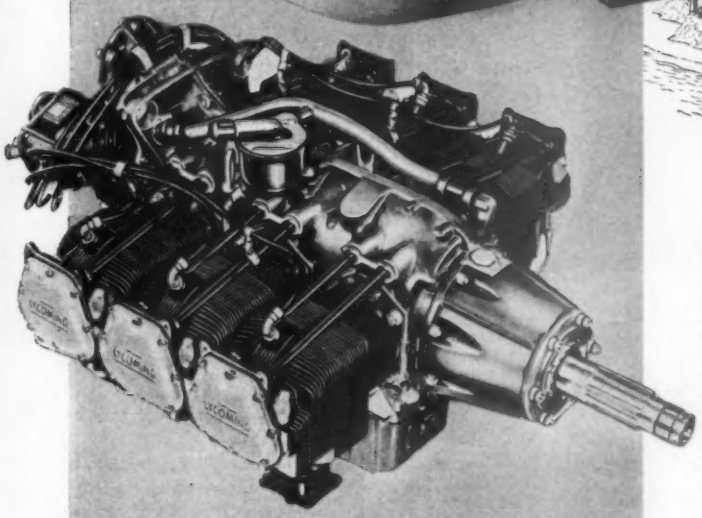
Two control stations are provided, also located at the ends of a diagonal; either will operate the unit without the other.

►**Model Tests**—Project development has proceeded to the point where a one-tenth-size model has been built and tested in the towing basin of the Stevens Institute of Technology, Hoboken, N. J. These tests have included many simulated contacts with a scale model of the Convair P5Y flying boat, as well as general hydrodynamic tests of the beaching gear.

These scale-model runs were used to develop the beaching procedure, because the model of the gear was powered and could be remotely controlled.

In picking up a flying boat, the beaching gear is first partially submerged by flooding parts of the floats. Then the operator of the gear approaches from the stern of the flying boat and positions the

(*Continued on p. 37*)



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in the

AERO COMMANDER!

AS A CLEAR DEMONSTRATION of the extra safety offered by the new Aero Commander, a standard model recently flew non-stop from Oklahoma City to Washington, D. C. *with one propeller removed.* Over and above such proven dependability, this luxurious executive type plane also offers smooth, quiet operation and high performance. It can easily be adapted for cargo or rescue service; equipped for land, snow, or water.

A MULTITUDE OF RIGOROUS FLIGHT TESTS have proven the extra dependability of Lycoming engines under the toughest operating conditions. The twin Lycoming GO-435-C2 engines in the Aero Commander are equipped with gear reduction—the same as that used in big commercial planes. The result is greater engine and propeller efficiency, making possible longer, more comfortable flights at lower cost. You can be sure of your plane when it's . . .

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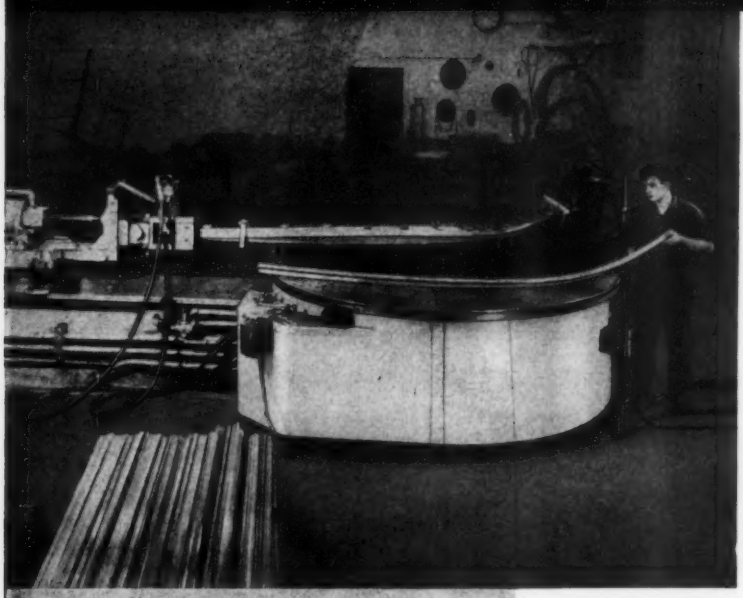
BATH the machine tho

SHEETS, EXTRUSIONS, TUBING O

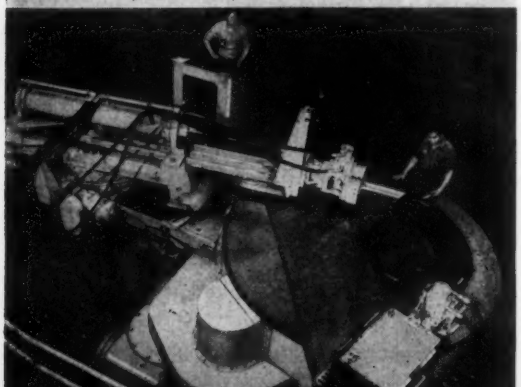


Above: Stretch-forming and twisting around a compound curve in a multiplicity of planes.

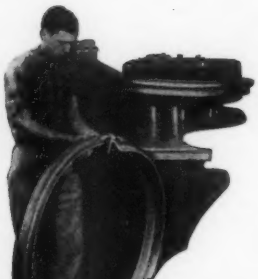
Four More Leading Aircraft Manufacturers Have Chosen BAT Contour Forming Machines

The BATH machine provides the 14 essen of a UNIVERSAL Contour Former. It is the o machine that can form virtually all the shap that will be required in future aircraft desig

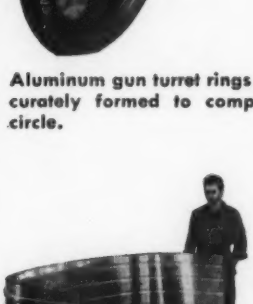
Hundreds of shapes, with compound cur and varying radii in many planes, are be formed on BATH exclusively because no ot machine can produce them. Read the 14 ess tials listed below and you too will choose BA —for only BATH provides them all.



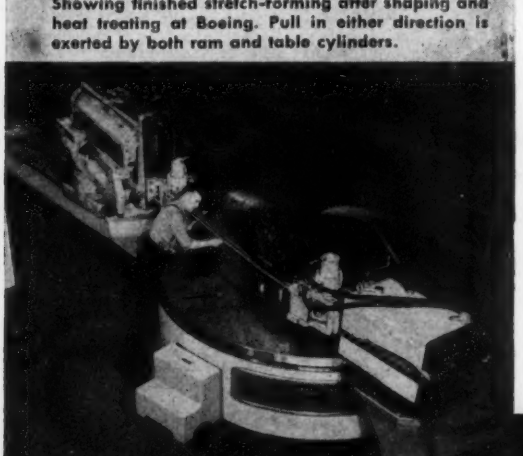
Showing finished stretch-forming after shaping and heat treating at Boeing. Pull in either direction is exerted by both ram and table cylinders.



Aluminum gun turret rings accurately formed to complete circle.

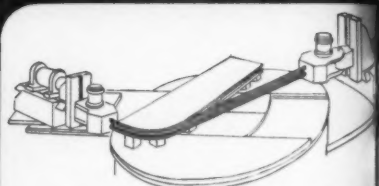


Large corrugated aluminum sheets accurately formed on the BATH machine.

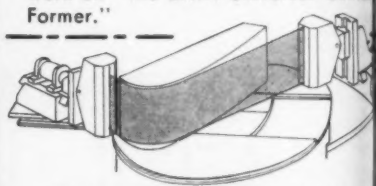


Illustrating the tangent stretching principle on a light section at Boeing. Same machine will handle from 1,000-lb. to 100,000-lb. pull.

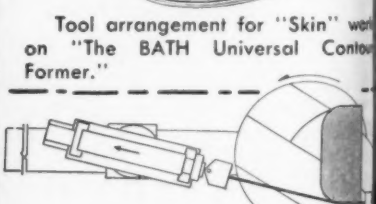
TYPICAL DIE SET-UPS



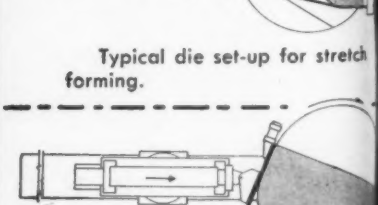
Tool arrangement for "Extrusion work on "The BATH Universal Contou Former."



Tool arrangement for "Skin" wor on "The BATH Universal Contou Former."



Typical die set-up for stretch forming.



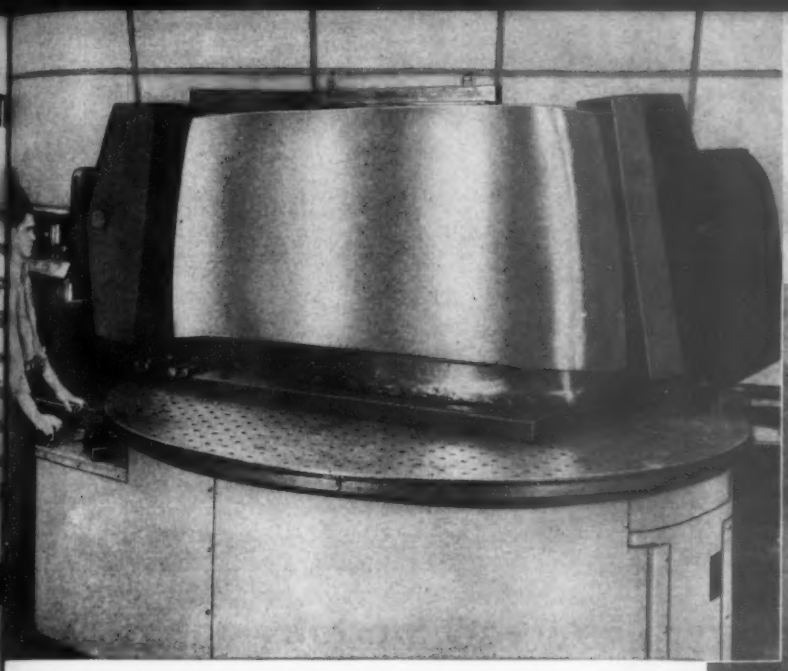
Typical compression forming set-up

THE CYRIL BAT C

7045 MACHINERY AVEN

ncorms ALL the shapes

NGOLLED AND FORMED SHAPES



Left: Photo illustrates how typical outer-skin section is stretch-formed on the BATH Contour Former. Rotating table construction permits forming sheets with most any combination of curves.

Showing aluminum "Z" extrusion being formed in both horizontal and vertical curves.

ly BATH Provides ALL These Features

Stretch and compress forming on one machine. Two-way acting cylinders and reversible table allows choice of forming method best suited to part.

Either sheets or extrusions are formed on the same machine. Jaw members are movable and adaptable to any cross section.

Tangential, progressive, line by line, forming on a rotating table permits small capacity machine to do the work of a heavier one.

Heavy sections and parts that cannot be stretched, may be wipe or roll formed.

Full circles or spirals are formed in one setting for most any alloy.

Long parts up to 25 feet or more, can be stretch-formed without re-setting jaws or dies.

Designed to stretch-form reverse bends without releasing tension on material.

Concentrated application of full tonnage over small area at a time permits angularity change on extrusions while contours are being formed.

Fast Set-Up: Die is mounted on table and stretch heads, wiper shoe or roll assembly, can then be easily adjusted to height desired.

Forms or Rolls in Two Planes: Produces parts with both horizontal and vertical curves simultaneously.

Material can be twisted while being formed in varying horizontal and vertical planes.

Safety: Over 10 years of operation have resulted in no known accident to an operator. Machine damage is prevented by shear pins at critical points.

Built to Machine Tool Standards: Deep sections, eliminating machine deflection, assures constant precise part duplication.

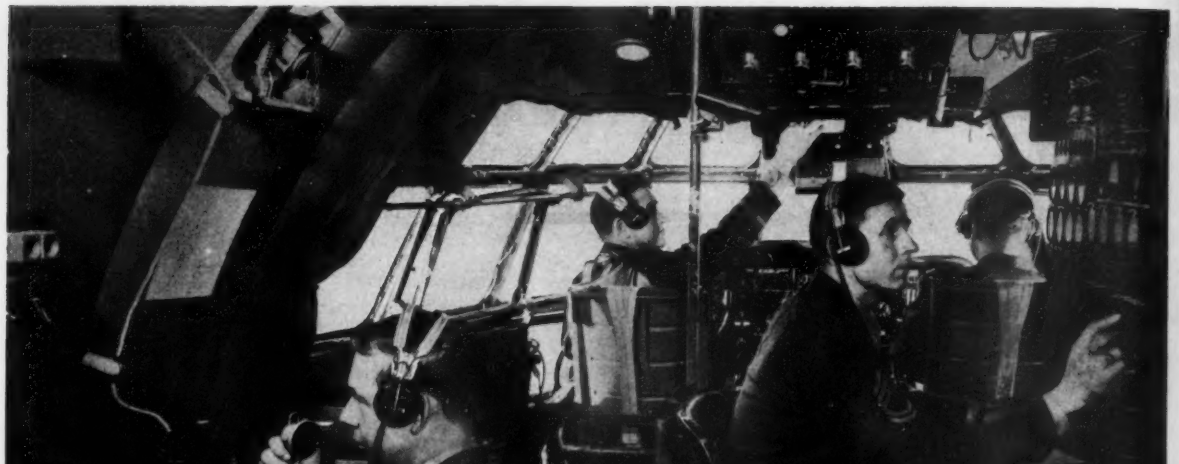
Faster production per hour with very low scrap loss, rarely running 1%.

Above: Jet flange rings, shrouds, cases, flame tubes, stiffeners and casings are formed in either full circles or segments.

Showing how full circles and spirals are formed on BATH machine.

T COMPANY

CLEVELAND 3, OHIO



Cockpit of a Military Air Transport Service Boeing Stratofreighter from which windshields of Pittsburgh Safety Glass give clear, unobstructed vision.

On Boeing's "quadruple-threat" Stratofreighter

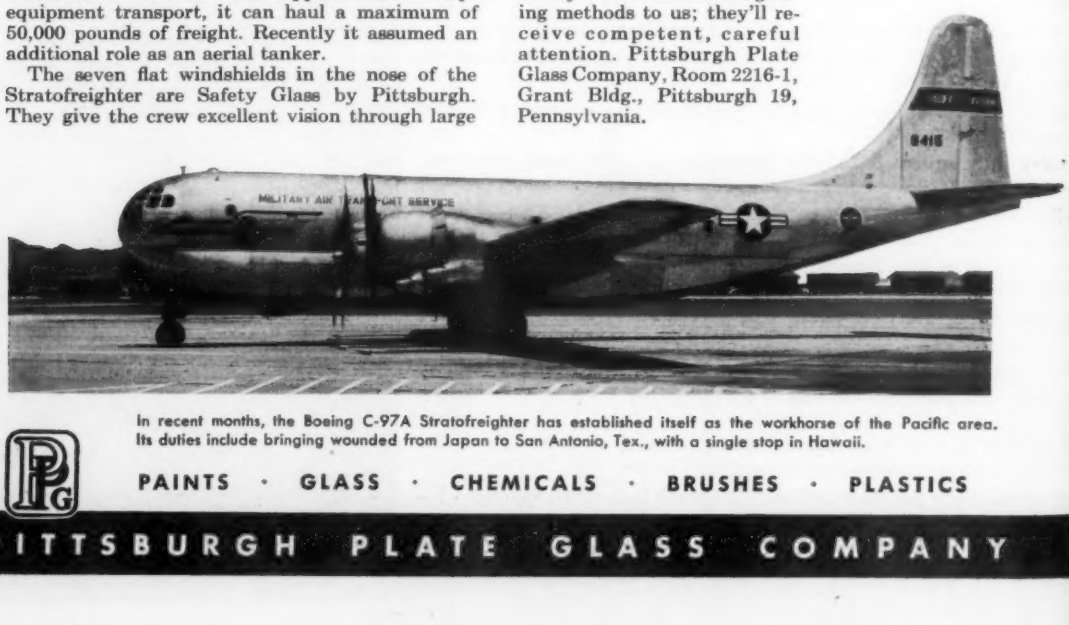
Safety Glass ... BY PITTSBURGH

● Boeing's big C-97A Stratofreighter ... transport sistership of the Air Force B-50 strategic bomber and the airline Stratocruisers . . . has demonstrated convincingly its versatility in Korean War service.

As a personnel carrier, the Stratofreighter carries 130 fully-equipped combat troops . . . as a flying ambulance, it can carry up to 79 litter patients with their medical attendants and supplies ... as a heavy-equipment transport, it can haul a maximum of 50,000 pounds of freight. Recently it assumed an additional role as an aerial tanker.

The seven flat windshields in the nose of the Stratofreighter are Safety Glass by Pittsburgh. They give the crew excellent vision through large glass areas—free from distortion and having unusually fine optical qualities.

The research facilities, manufacturing equipment and practical know-how of Pittsburgh Plate Glass Company have played an important role in development of today's military and commercial aircraft. Bring your problems involving Safety Glass and aircraft glazing methods to us; they'll receive competent, careful attention. Pittsburgh Plate Glass Company, Room 2216-1, Grant Bldg., Pittsburgh 19, Pennsylvania.



In recent months, the Boeing C-97A Stratofreighter has established itself as the workhorse of the Pacific area. Its duties include bringing wounded from Japan to San Antonio, Tex., with a single stop in Hawaii.

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(Continued from p. 32)
gear under the main part of the hull. He is aided in this by visual positioners painted on the hull.

To prevent any damage to gear or boat pneumatic bumpers are installed at all contact points. Four sloping guide pads keep the hull centered between the floats while two large, low-pressure pneumatic cushions are raised from each float to bear against the underside of the wing. These prevent relative motion between the beaching gear and the flying boat hull while the flooded compartments are pumped out.

▶**Water to Land**—Under its own power, the beaching gear proceeds toward shore. Near the beach, the operator transfers power from the water propellers to three caterpillar treads mounted in the manner of a tricycle landing gear on aircraft. These treads are capable of operating over average sandy beaches.

Once aground, the gear goes to an unloading platform to which the pallet and flying boat can be transferred. This operation is done by a tractor or winch which moves the wheeled pallet from the gear to the platform. The beaching gear can then proceed to the water again to haul out more flying boats.

Beaching gear and pallet have built-in provisions for handling repairs and general servicing. The pads of the pallet are segmented and can be quickly adjusted by screw jacks to fit any hull. Then several of these pads may be dropped to allow access to the bottom of the hull.

More Skyrocket Details Revealed

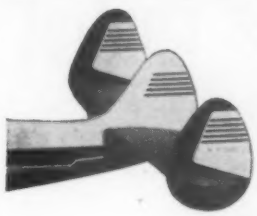
The Douglas D-558-2 Skyrocket research plane, which recently claimed the world's speed and altitude records for piloted planes, made the transition into the supersonic region very smoothly, but there was noticeable buffeting as it came back out, test pilot Bill Bridgeman stated following his recent record-breaking flight (AVIATION WEEK July 16, p. 14).

Security still cloaks the exact altitude attained by the Navy supersonic speedster, but it was admittedly "over 63,000 ft." At no time has the plane been flown higher than the absolute balloon record (72,394.795 ft.) set by U. S. Army Air Corps' Capts. Orvil A. Anderson and Albert W. Stevens in 1935.

Bridgeman was dropped from beneath the Navy Boeing PB-1S (B-29) at an altitude of about 35,000 ft., fell about 1,500 ft. before igniting the first cylinder of the Reaction Motors rocket motor, then began his steep ascent.

Somewhere above 63,000 ft., and about 50,000 yd. from Muroc AFB, he pushed the plane over to begin his

Hartman D-C Controls give protection plus



on the L-649, L-749

and now on the L-1049

Super Constellation

Photo: Courtesy Lockheed Aircraft Corp.

Working in conjunction with Lockheed, Hartman engineers designed and developed the control units illustrated below to provide reverse current and feeder fault protection for the Constellation's 28.5-volt system.

A-726A Generator Control and Fault Sensing Relay gives reverse current protection and differential current fault sensing; is capable of carrying 400 amperes continuously.

AVR-735 Forward Current Relay prevents Fault Sensing Relay from causing false trips under certain conditions of reverse current.

A-712A Contactor with continuous rating of 600 amperes. Bridging contacts, in series with those of cutout, provide emergency capacity to interrupt high voltages and currents that can exist under overvoltage conditions.

If you have a problem in d-c controls, turn it over to Hartman's development engineering staff for a speedy solution. We'll be pleased to consult with you at your convenience. There's no obligation, of course. A-5000

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AVR-735

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descent back to the base. During the "pushover," blood rushed to his head and he felt lightheaded. Apparently, the plane's terrific speed did not build up sufficient skin friction to make the cabin uncomfortable. In fact Bridgeman stated that it was necessary to heat the cabin. Outside temperatures varied from about −37 to −67 deg. F. It was noted that the Skyrocket's cabin is pressurized to maintain 28,000 ft. altitude with the plane flying in a "vacuum."

Also gleaned during the interview:

- Skyrocket's wing can withstand over 12G.
- Glide ratio, with power off, is about 10:1.
- No control boost is incorporated.
- At extreme altitudes, the rocket motor flame is approximately one-and-a-half time's the D-558-2's length.
- There is noticeable instrument lag during the speed runs. For example during one climb, Bridgeman thought he was pushing over at 55,000 ft., radar tracked him as going over at 58,000.
- The Skyrocket has not yet been taken off from the ground using just the rocket motor. Also, the turbojet-rocket powered models will not get off the ground using just the jet. Rato has been used for assisted boost.
- Some additional fin area was found necessary to improve stability characteristics.
- An indication of the Skyrocket's ruggedness was graphically provided when the main left landing gear on one of the planes folded on touchdown. Only about a foot of the wingtip was damaged. The plane was repaired and ready to fly the next day.
- Physical check-up of pilot twice a year has been found adequate.

NACA Reports

▶Method for Calculating Downwash Field Due to Lifting Surfaces at Subsonic and Supersonic Speeds (TN 2344) —by Sidney M. Harmon

Calculation of the downwash field at subsonic speeds relies almost exclusively on Prandtl's lifting-line theory. At supersonic speeds, the methods for calculating downwash utilize conical flows, potential doublets, vortices, and pressure doublets. The integrations for several of these methods have been found generally difficult and the practice has been usually to use approximate methods based on lifting-line theory.

The present report indicates a method to facilitate computations for obtaining exact linearized downwash field due to lifting surfaces at subsonic and supersonic speeds. The method is applied to derive formulas for downwash

due to uniformly loaded flat and rectangular wings of infinitesimal thickness at these speeds.

These formulas can be used to obtain the downwash field on wings of arbitrary loading by means of correspondence relations given in an earlier work by the same author (NACA TN 2303, 1951).

An illustrative example is given in which formulas are derived for the rectangular wing at supersonic speeds with uniform loading and for linear chordwise variation in loading.

▶**Method of Successive Approximations for the Solution of Certain Problems in Aerodynamics (TM 1286)—by M. E. Shvets.**

This note is a translation of a piece originally appearing in a Russian technical journal in 1949. It presents the approximate solution of some boundary-layer theory problems. The method used by the author combines boundary-layer and successive-approximation methods.

Problems considered include the solution of the diffusion equations, the boundary-layer equation for a flat plate in incompressible flow, fluid motion and heat transfer in laminar boundary layer and cooling of a heated sphere.

▶**Some Theoretical Characteristics of Trapezoidal Wings in Supersonic Flow and a Comparison of Several Wing-Flap Combinations (TN 2336)— by Robert O. Piland**

This note reports a theoretical investigation made of a trapezoidal wing with raked-out tips. The aerodynamic expressions derived were lift and pitching moment due to angle of attack, and pitching and lateral force and yawing moment due to roll. Equations given for derivatives of these factors apply when the inboard Mach line from a leading-edge tip intersects the trailing edge, and the outboard Mach line lies ahead of the side edge. In the case of a wing with raked-in tip the former condition is sufficient. The derivatives are presented in chart form.

What might actually be considered a second part of this report deals with a comparison of lift due to flap deflection, and rolling effectiveness for types of flaps on various transforms. The following conclusions were reached:

- **Most favorable characteristics** came from the triangular wing with either half-delta tip or trailing-edge flap.
- **Rolling effectiveness** was maintained throughout the range considered by the half-delta tip flap with point forward.
- **The half-delta tip flap,** point forward on trapezoidal wings, increases the effectiveness of roll at the higher values of the product of the Mach number parameter and the lift curve slope.—DAA

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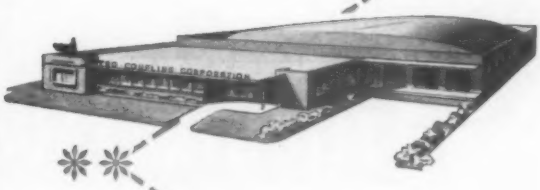

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Today, when military and civilian demands for its products have doubled all previous records, Aeroquip announces the *completion* of a sizable expansion program. Two new structures and the acquisition of a new subsidiary have added more than 100,000 sq. ft. of highly productive space to Aeroquip's plant facilities.

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******In Jackson, Michigan, there is a new 65,000 sq. ft. addition to the Aeroquip main plant.*

*******In Burbank, California, this modern 30,000 sq. ft. plant has just been completed.*

********Metalco, Inc., a new Aeroquip subsidiary, operates this plant in Cheboygan, Michigan.*

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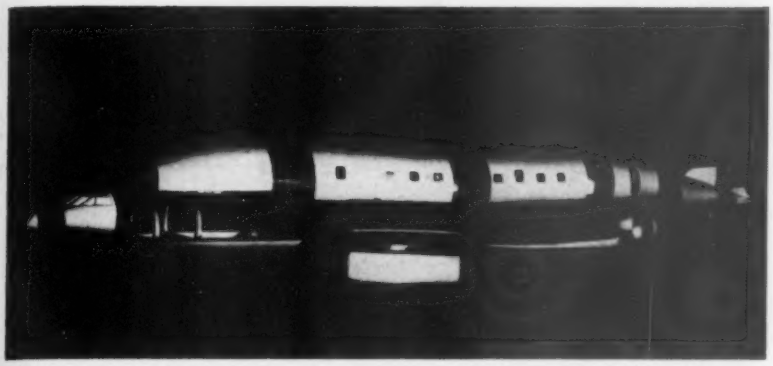
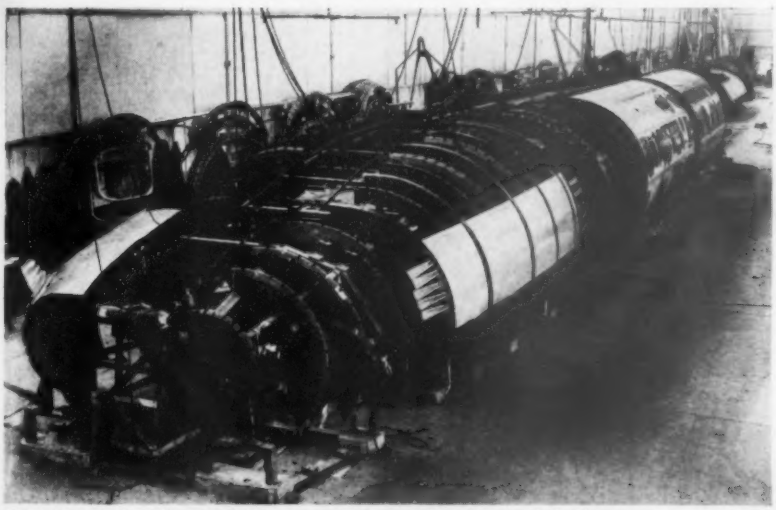
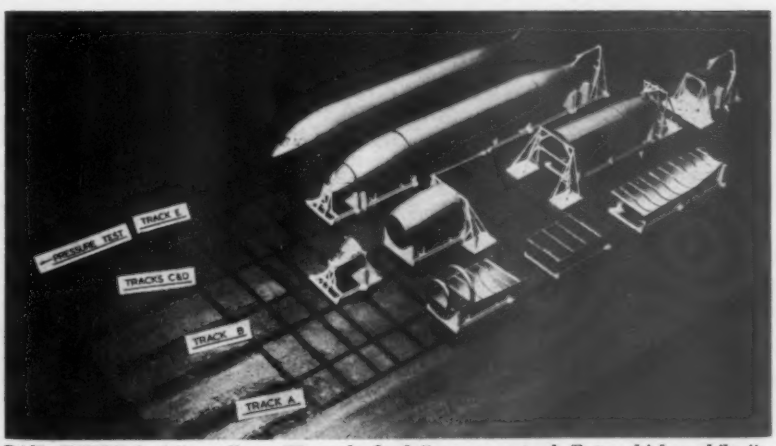
Trolley Ride Speeds Comet Production



COMET FUSELAGE shown in main components. All these parts are fabricated on . . .



STATIC JIGS, and assembled components transferred to mobile jigs on . . .



RAIL SYSTEM of jig trolleys. The only fixed jigs are on track B to which mobile jigs are hooked up with V-blocks and plates, for assembly. On track C (D is similar) final hookup is made, again with V-blocks and plates. Track E carries completed craft to pressure test.

Jigs carry components on track system along the factory floor.

Production of the Comet literally is rolling. De Havilland Aircraft Co., Ltd., is using a series of jig trolleys on tracks to ease movement and assembly of the large components of this pioneer, four-jet transport.

Details of the track and jig system recently were outlined in a paper on the planning and production methods used in construction of the Comet given by de Havilland's production director H. Povey before the Royal Aeronautical Society.

▶ **From Fixed to Movable**—One of the main purposes of the system is to keep the external part of the fuselage free from jig structure so that assemblymen will have ready access to the work.

To feed the track, a number of components are made in static jigs. These parts include the fuselage nose, forward section, carry-through structure, pressure floor, fuselage sides, front and rear keels, pressure dome and tail cone.

Once the subassemblies forming the breakdown of the fuselage are received on the track, they are transported by the jig trolleys to the various stations along the track to complete the operations for finishing the structure.

▶ **Alignment Scheme**—The factory floor is considered as a table. De Havilland's

COMET WING breakdown shows the inboard and outboard panels, jet engine intakes, powerplant cowlings. Inboard panel is built on fixed jig (top photo, p. 43).

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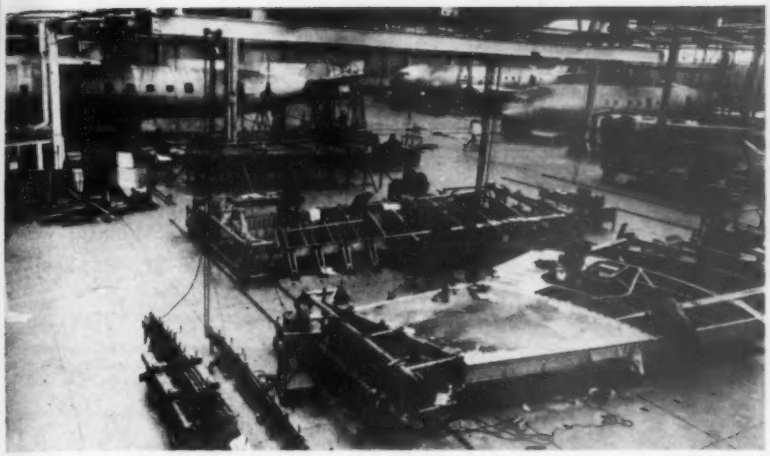
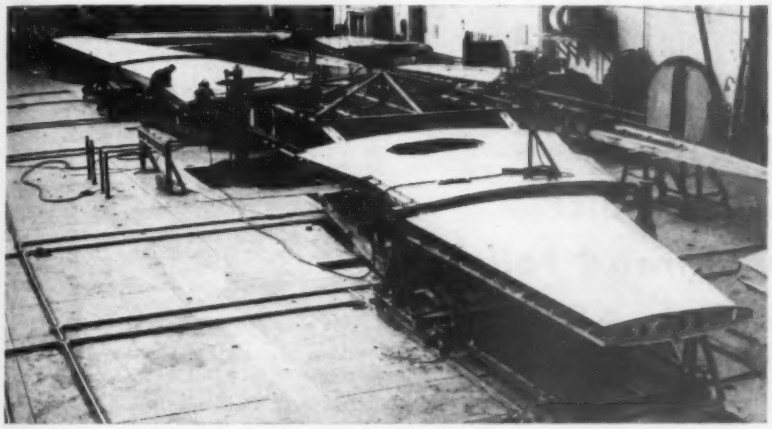


FIXED JIG is located over pit for two-side access. Panel is then transferred to . . .



DRILL JIG for center section where nest of 252 close-tolerance holes for wing attachment bolts are drilled. This jig is designed to insure complete interchangeability, and accuracy in angles of sweepback, dihedral, incidence.

technicians aren't concerned with the accuracy of the floor or the rails it carries. Actually, the accuracy and flatness of this large area depends upon the alignment of a number of V-blocks and small flat surface stools.

The jig trolleys also are fitted with V-blocks and surface pads for mating to these fixed blocks and plate stools located at strategic spots along the production line floor. A simple screwjack arrangement on the wheel of each trolley facilitates the connection of the mobile unit to the fixed portions built into the floor, so that the nose, skins, pressure dome and other parts can be properly controlled for mating to the corresponding component on the jig trolleys.

▶ **Wing Work**—Wing fabricating track is similar to the fuselage track. The jig for the inboard panel (stub wing) is static, but when the unit is withdrawn from the jig and put on the track circuit, it is taken to the various stations for such operations as drilling for attachment to fuselage, attachment of engine cowlings, cowling doors, air intakes, jet pipe cowlings, and leading edge, flaps and ailerons.

AF Contracts

Unclassified Air Force contracts totaling over $9 million were announced by the Air Force for the week ended July 6. How much more than $9 million the contracts were worth is not known, as 23 awards were listed merely as "over $250,000." The partial alphabetical list follows:

American Fixture & Mfg. Co., St. Louis, metal chairs, Cl. 40A, exceeds $250,000; metal chairs, Cl. 40A, 1,607 ea., $40,365.

American Gas Accumulator Co., Elizabeth, N. J., transformers, Cl. 08D, 4,050 ea., $83,855.

American Radiator & Standard Sanitary Corp., Pittsburgh, facilities for production of magnesium castings, over $250,000.

Bassons Industries Corp., Bronx, N. Y., modification kits, Cl. 13A, 20,500 ea., $67,240.

Bausch & Lomb Optical Co., Rochester, metrogen lens, Cl. 10A, 75 ea., $28,587.

Bell Aircraft Corp., Buffalo, facilities, over $250,000.

This picture* does not equal 10,000 words

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* **This Horizontal Jig Borer is typical of the high precision tools designed and built by Indiana Gear for their own use.**

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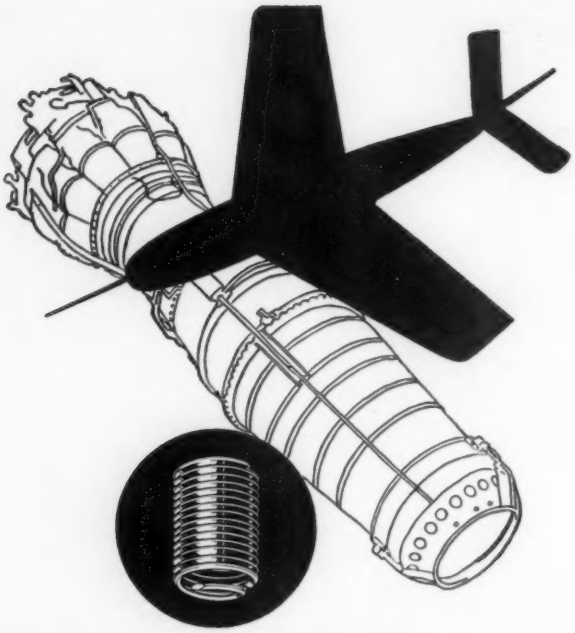

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Boeing Airplane Co, Wichita, facilities, over $250,000.

Breeze Corp., Inc., Newark, N. J., various sizes of steel hose clamps, Cl. 04A, 409,300 ea., $54,410.

S. Buchsbaum & Co., Chicago, covers, aircraft protective, Cl. 20, 50 sets, $54,212.

Burroughs Adding Machine Co., Dayton, check writing machine, Cl 25A, 35 ea., $38,860.

Cannon Electric Co., Los Angeles, connectors, Cl. 08E, 16,300 ea., $96,673.

Cramer Posture Chair Co., Inc., Kansas City, metal swivel chairs, Cl. 40A, 7,500 ea., $149,025; metal office chairs, Cl. 40A, 6,000 ea., $119,220.

Curtiss-Wright Propeller div., Curtiss-Wright Corp., Caldwell, N. J., facilities, over $250,000.

Division Lead Co., Chicago, solder wire and bar, Cl, 23A, 170,000 lbs., $141,406.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, N. J., development of generators and blower assemblies, Cl. 03C, $59,979.

Elastic Stop Nut Corp. of America, Union, N. J., self locking nuts, Cl. 04A, 4,086,500 ea., $49,783; aircraft steel nuts, Cl. 04A, 1,103,000 ea., $90,047; aircraft steel nuts, Cl. 04A, 334,000 ea., $29,726.

Electric Auto-Lite Co., Toledo, spare parts for maintenance of fuel servicing trailers, Cl. 19C, 25 items, $69,933.

Ex-Cell-O Corp., Detroit, facilities for production of engine components, over $250,000.

Fairchild Engine div., Fairchild Engine & Airplane Corp., Farmingdale, N. Y., industrial facilities, over $250,000.

Federal Motor Truck Co., Detroit, spare parts for truck tractors, Cl. 19C, 69 items, $97,816.

Ford Motor Co., Dearborn, industrial facilities, over $250,000.

Russell R. Gannon Co., Inc., Cincinnati, airplane mooring kits, Cl. 19A, 1,221 ea., $84,279; chock assembly, Cl. 19A, 10,000 ea., $53,500.

General Electric Co., Dayton, regulators, Cl. 08D, over $250,000.

General Fireproofing Co., Youngstown, desk, steel, Cl. 40A, 1,023 ea., $91,486.

Gisholt Machine Co., Madison, Wis., machine, dynetic balancing, Cl. 17C, 2 ea., $48,387.

Huss Bros. Instrument Co., Washington, D. C., mercurial barometers, Cl. 17C, 107 ea., $56,159.

R. M. Hollingshead Corp., Camden, aircraft cleaning compound, Cl. 07, exceeds $250,000.

International Postal Supply Co. of New York, Brooklyn, check signing machine, Cl. 25A, 50 ea., $54,465.

Jack & Heintz Precision Industries, Inc., Cleveland, industrial facilities, over $250,000.

Jamestown Metal Corp., Jamestown, N. Y., filing cabinets, Cl. 40A, 227 ea., $98,942.

Johnson Products, Inc., Muskegon, Mich., industrial facilities, over $250,000.

Justrite Mfg. Co., Chicago, penlight, flashlight, Cl. 08A, 100,000 ea., $95,000.

Kindred Aviation Corp., Burbank, cylinder stud assemblies, Cl. 02A, 500 ea., $36,250.

Knox Metal Products, Inc., Waynesboro, Ga., utility type trailers, Cl. 19A, 71 ea., $33,893.

Lanagan & Hoke, Philadelphia, aviation ignition and accessory cables, 632 ea., $104,567.

Menasco Mfg. Co., Burbank, facilities for production of landing gears, over $250,000.

Morse Instrument Co., Hudson, Ohio, printers, Cl. 10B, exceeds $250,000; timer and data, Cl. 10B, exceeds $250,000.

Optron Laboratories, Dayton, precision mirrors, 4 ea., $37,092.

Oracle Engr. & Sales Corp., Tucson, airplane mooring kits, Cl. 19A, 1,221 ea., $81,539.

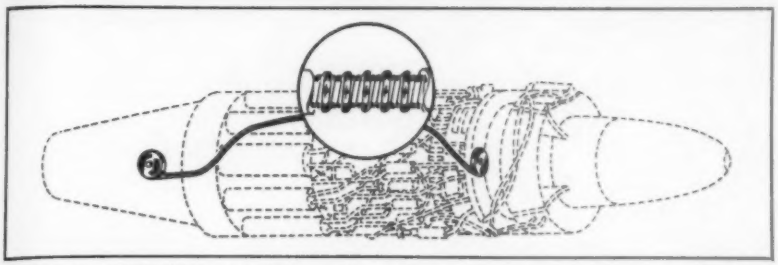
Pioneer Parachute Co., Manchester, Conn., parachutes, Cl. 20, over $250,000.

Pitney-Bowes, Inc., Stamford, Conn., industrial facilities, over $250,000.

Recordak Corp., New York, photographic film, Cl. 10C, 185,644 rolls, $28,647.

Remington Rand, Dayton, file cabinets, Cl. 40A, 1,700 ea., $82,657; filing cabinets, Cl. 40A, 200 ea., $37,772.

EQUIPMENT



HELICAL WINDING of Teleflex cable is shown in circular inset on jet installation.

Teleflex Control Gets in Jet Act

'Around-the-corner' control properties of the flexible system are finding turbine and turboprop uses.

"Teleflex," well-known mechanical remote control used in numerous applications on many aircraft, has gotten into the jet act. The manufacturer reveals that Teleflex "is now being tested for a super-jet engine to control certain valves on the afterburner. . . . It also has been successfully tested for the operation of a special propeller control on a turboprop engine."

▶**Around the Corner**—Teleflex is capable of transmitting force or motion from one point to another, around corners and through bulkheads by moving a flexible cable inside a conduit. Main construction feature of the system is an outer wire wound helically around the main body of the cable. This permits push-pull motion to be transmitted a considerable distance and through many bends, with a minimum of friction. The outer wire, or helix, of the cable engages with a specially hobbed gear to permit unlimited rotary movement.

The maker, Teleflex, Inc., points to these other features of its product:

• **Helix winding** of cable permits quick, positive connection with all other end fittings and control boxes.

• **Lubricant reservoir** reduces maintenance and freezing hazard—Teleflex can withstand extreme temperature ranges.

• **Installation flexibility** is assured because the cable system need not be prefabricated.

• **Rugged construction** reduces possibility of damage during handling and while in service.

• **Adjustment is rarely needed.** But, if changes are required in the control system, considerable adjustment can be made with ease.

• **Special stress-relieving process** prevents the cable from unraveling when cut.

• **Operation is quiet** and backlash is reduced to a minimum.

Unique feature of Teleflex control, the maker says, is the system's ability to accommodate unlimited travel and rotary movement. Another valuable feature is that control boxes may be incorporated at intermediary points between input and output ends of the system to serve as indicating units or supplementary controls.

The company, whose headquarters is in Philadelphia, points out that there are relatively few accessories required for installation of a Teleflex system. It is claimed to be one of the lightest and simplest forms of power transmission known for certain applications.

Cargo Handler Is Air Transportable

The latest word in airfreight equipment is a knock-down cargo loading system which can be hauled by air and set up to bring maximum efficiency and speed to cargo handling operations in remote corners of the world.

Demonstrated recently to the military, the equipment is the joint development of Lockheed Aircraft Corp. and Weber Aircraft Co. Built from the ground up for air portability—by engineers closest to the problems involved—it can be disassembled quickly and stowed in the main or lower cargo compartment of most transports. The system represents one more forward step in simplifying and speeding cargo handling.

▶**One-Man Operation**—With it, one man alone, in an emergency, could load the cabin of a large transport to capacity, Lockheed says. He can lift, at one time, five tons of cargo up 12 ft. to the entrance of the plane. He can haul heavy machinery into the cabin and move it fore or aft, to the left or right, to the exact spot he wants to place it. At an advanced base, he always is assured of power for the system, since it draws its power from the electrical system of the plane he is loading.

Major components of the system are a mobile, oversize elevator with a 10 x 10 ft. platform, operating in conjunction with a special chain conveyor which is built into the floor of the plane.

▶**Elevator**—The elevator or lift consists of stanchions or posts at each corner supported by an aluminum alloy framework. The elevator bed fits between the poles. Cables attached to the bed run up over the top of the posts and down, connecting to a motor and winch mounted in the rear of the frame. Special, flexible ramps, which can be raised like drawbridges, are attached at opposite ends of the bed and permit carts and handtrucks to be wheeled onto the elevator and into the plane. The unit is mounted on wheels. When in use, it rests on self-contained jacks.

Besides handling freight, the lift can be used to expedite loading and unloading of litter patients. It also serves as a convenient work platform for maintenance crews.

▶**Stevedore**—When loads have been carted off the elevator through the plane's entrance, its partner in work, the "Aero-Trusty" stevedore conveyor takes over. This equipment is a subfloor endless chain running the length of the cabin. In a floor slot, a device hooked into the electrically driven chain pushes or pulls loads up to 10,000 lb.

Particularly convenient to the operator are the portable switches included with the conveyor system. The switch unit is attached to a long cable running on a swivel reel hooked to the ceiling, permitting the operator to walk beside the cargo being hauled by the conveyor. Movable snatch blocks and a hand-held pulley device permit power of the conveyor to be applied to move cargo in any direction. All but a few small pieces of the conveyor system are removable to save weight when required.

An added feature of the loading system is a cart (3,000 lb. capacity) which can be used to roll loads into the plane without extra handling. It can be pushed by hand or coupled to others for a trackless train operation.

Development of the new loading system to replace fork-lift trucks and hoists adds greatly to the utility of transport-type aircraft, especially those with cargo compartments many feet off the ground, says L. R. Hackney, Lock-

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heed air cargo engineer. He believes the conveyor will reduce the manpower needed to handle weighty objects and will make aircraft more efficient carriers of bulky objects such as aircraft engines and heavy machinery.

Pushbutton Switch

Reinstatement to its production-line of lightweight, aircraft, pushbutton switches has been announced by the Square D Co.

These pushbuttons are designed for use in aircraft systems such as fire control, turret control, communication and signal systems and for remote control of relays, solenoids and motors. They are described as capable of operating through a temperature range of −65 to 160 F. and withstanding accelerations up to 10G. (in any position). Switches can handle a 15 ampere inductive load, at 30v. dc. at 40,000 ft. altitude.

Models now in production are the two point, two terminal type, available with either normally closed or normally open contacts, and the three point, three terminal type furnished with normally open contacts. Identification discs are provided under the Lucite caps. Both models are available in a variety of flange and mounting arrangements. Address: Square D Co., 6060 Rivard St., Detroit 11, Mich.

No Weld . . .

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Reusable

Making Exhaust Sockets Last Longer

Constellation engine exhaust collector ring ball sockets looked liked figure at upper left when new. Note the two separate layers of metal around the upper rim. Same socket looked like upper right figure at overhaul—outer lip flared out and bent—not worth salvaging. TWA master mechanic Jay Losey suggested welding the new sockets' two pieces together (lower left). Result is a reusable socket at engine change (lower right). Also TWA saves a lot of money and Losey is a thousand dollars richer (before taxes).

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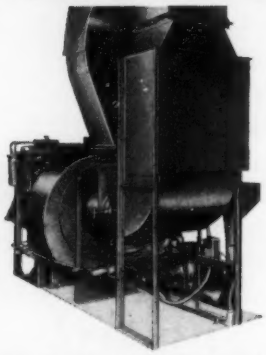

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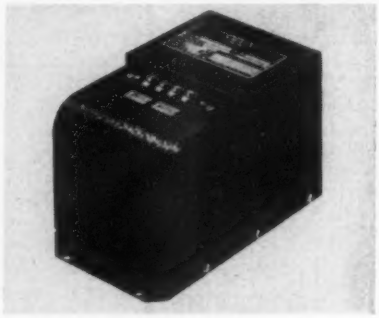


Voltage Control

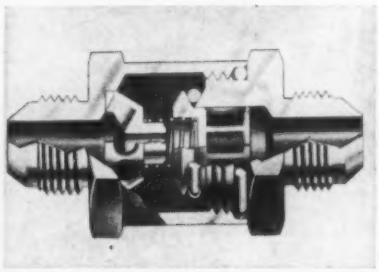
A device expected by engineers who developed it to "solve hundreds of electrical control problems in industry" is being marketed by the Sola Electric Co.

Designed to overcome voltage instability problems, the "Sensivolt," as it is called, controls and protects electrical machinery by reacting to very slight changes in the voltage of alternating current. The device is responsive to fluctuations as small as one-half volt the firm says.

The unit can be employed to react automatically to whatever unpredictable fluctuations occur in line voltage—or it can be stimulated deliberately by modulating voltage at the power source, according to Sola.

Some initial uses of the device as the company sees it will be:

- Remote operation of auxilary power equipment at isolated stations.
- Protection of motors and other electrical equipment against excessively high or low voltage.
- Step by step voltage regulation.
- Control of several selective voltage circuits from a single variable voltage source. Address: 4631 W. 16 St., Chicago 50.



Check Valves

Precision check valves for aircraft, said to combine the basic advantages of poppet design with the operating characteristics of a swing check valve, are the latest addition to the line of "Circle Seal" products produced by James-Pond-Clark.

Extremely low cracking pressures and pressure drop have been achieved without sacrificing dead tight sealing, according to the manufacturer. The valves can be used with engine oil, hydraulic fluids, air, and other gases, aircraft fuels and fuel vapors.

Designed against effects of vibration and for mounting in any position, these valves use standard "O" rings, thus simplifying procurement problems by eliminating need for stocking special molded parts. According to the maker, swelling of the synthetic rubber rings caused by aircraft or jet fuels does not adversely affect sealing action.

The new parts are available in an 800 Series, designed so they are both physically and functionally interchangeable with aircraft type swing check valves. An 8800 Series model, while functionally the same as the 800 Series type, is shorter in length—for use where small size and weight-saving features are more important than physical interchangeability. Specifications: Operating pressure, 0 to 500 psi.; cracking pressure, 6 to 8 in. H_2O; operating temperature, −65 to 280 F.; leakage, zero. Address: James-Pond-Clark, 1247 E. Green St., Pasadena 1, Calif.

ALSO ON THE MARKET

Printed Code tape, AND10375, for aircraft pipelines are immediately available in complete line; include such color coded bands as rocket oxidizer, rocket fuel, water injection, air conditioning, fire protection, etc. Topflight Tape Co., 116 E. Market St., York, Pa.

"EutecRode 70" chrome-nickel welding alloy is specifically designed for repair and maintenance work on chrome-moly steel parts. Advantages are high tensile strength and low amperage application, according to Eutectic Welding Alloys Corp., 172 St. and Northern Blvd., Flushing, N. Y.

Dry chemical fire extinguisher has increased discharge time, giving unskilled operators more time to put out fire. Pressure to eject extinguisher is derived from small CO_2 cylinder located in the dry chemical chamber. Nozzle to produce fan-shaped stream pattern is self-closing, making the unit weathertight. Extinguisher weighs 10¼ lb. fully charged and is provided with hose 15¼ in. long. Made by Ansul Chemical Co., Marinette, Wis.

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Conferences iron out problems, help make work at Lockheed more pleasant

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It's not just the modern, air-conditioned buildings that make working conditions so much better at Lockheed. It's the top engineers who work with you. It's the way personal initiative is encouraged. It's the frequent engineering conferences that iron out problems quickly. It's being a member of a team known for leadership in aviation.

Outdoor life prevails in California – at beaches and mountains, at home, even symphonies in Hollywood Bowl

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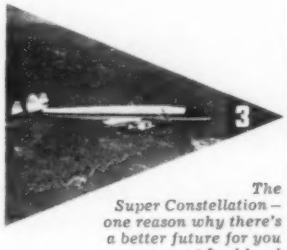

The Super Constellation – one reason why there's a better future for you at Lockheed

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CONTRACT FOR FIVE NWA Martin 2-0-2s is signed by Cal Central president, Col. C. C. Sherman. Looking on, l. to r.: Edward Sloan, NWA vice president-general counsel; Croil Hunter, NWA president; Capt. H. R. Conover, CCA assistant director of operations; Robert W. Buelow, NWA assistant to vice president-operation.

CCA Switches to Postwar Planes

California intrastate operator converting fleet to former NWA 2-0-2s, now called Martinliner 300s.

By Thomas L. Self

California Central Airlines, the intrastate operator who pioneered air coach on the Los Angeles to San Francisco run, intends to stay out in front.

Beginning about Aug. 15, CCA will switch its equipment completely to "Martinliner 300s." The line expects to have four of its five Martinliners (renamed from the 2-0-2) in service by Labor Day and the fifth soon after.

The company already has taken delivery of four of the new ships and is overhauling them and training its pilots to fly them.

Col. C. C. Sherman, president of CCA, only recently closed the deal with Northwest Airlines for the five planes, plus about $300,000 in parts. In exchange CCA turned over five DC-3s and two DC-4s to NWA, plus an undisclosed amount of cash.

▶**Faster Service**—The new equipment won't bring any change in fares or any immediate changes in schedules. But the faster speed of the Martinliners—just an hour and 17 min. from Los Angeles to San Francisco, or an hour faster than the DC-3s—will enable the airline to boost schedules as traffic permits. In the meantime, CCA will continue its five flights daily each way between San Francisco and Los Angeles and ten flights on Sundays, plus three daily flights to San Diego.

The Martinliner purchase puts Sherman in a stronger position to resist pressure from United, Western and other operators on the L.A.-S.F. run. They won't be able to replace present equipment for many years. And if they use DC-6s or other new postwar equipment, they'll have to divert it from their first-class schedules.

United's president, W. A. Patterson, recently told AVIATION WEEK that "there is still a lot of meat on the L.A.-S.F. bone," and expressed the company's reluctance to increase coach operations by curtailing first-class fares.

▶**Tough Financing**—Swinging the deal for the Martinliners took quite a bit of doing. Sherman said he had the same experience financially when he originally set up his company—the banks mysteriously backed out of the deal and he had to go to a "three-ball artist" to dig up the cash.

Sherman started thinking about the equipment exchange last November. He had been actively negotiating the deal with NWA for the past three months. The deal still has to be approved by RFC, but that is expected to be a formality. Arrangements were slow because everything had to be cleared with all 19 of the banks who participated in the $21-million bank loan to NWA in 1949. No CAB approval is needed.

CCA will not change the first-class seat configuration of the Martinliners but its versions will fly with 44 seats. Modification will be made by knocking out the galley and part of the radio compartment. CCA will install two four-man bars at the cabin's front end.

▶**Past History**—Sherman is not worried about the past history of the Martinliners because he feels they were overworked at NWA and flown in weather many times more severe than will be encountered in California. Moreover, he is performing all the airworthiness directives on the ship plus the major recommendations of the Martin 2-0-2 Modification Board.

CCA currently is putting its pilots through a $75,000 training program to check them out in the Martinliners.

The Martin company, Sherman told AVIATION WEEK, is being very cooperative and "is treating us like a new customer." It has sent out engineers to oversee the modifications. NWA has sent maintenance personnel and flight instruction people to help CCA make the change to the new planes.

▶**Schedules**—The Martinliners will be placed into service either one or two at a time. Each one will be named for a city on CCA's principal routes—Los Angeles, Burbank, San Francisco, Oakland, San Diego. CCA will hold a party in each city to introduce the planes.

Sherman's remaining three DC-3s will be kept as spares or used on the Burbank-Inyokern run. The Burbank-

Inyokern run was started in February of this year to fly technical people from the L.A. area to the Navy testing facilities. There are two flights a day, one in the morning and one at night, with load factors currently about 38%. This service now has been extended to Edwards AFB, Muroc, Calif., at the Navy's request.

California Central's load factors on the L.A.-S.F. haul are averaging 83.7%. The San Diego run has dropped to 46.9%. The line carried 13,294 passengers, or 3,973,706 passenger miles in June. New equipment will probably boost figures on all runs. The setting up of a local service system would add to the Los Angeles-San Francisco run.

CCA temporarily abandoned its plans for a Los Angeles to Fresno run.

The intrastate carrier, which flew its first schedule in January, 1949, is still waiting for certification from CAB so that it can fly to Las Vegas and Reno. These Nevada resort towns are just across the California border but they are practically playrooms for Los Angeles and San Francisco people.

▶ **Airport Troubles**—CCA's only other troubles at the moment involve airports. At the Los Angeles Airport, CCA has been denied access to the public address system. The system, peculiarly enough, was financed by the "Big Six" when it was installed, as the airport was short of funds. It is operated by TWA rather than the airport. Now the big fellows deny CCA admittance, Sherman says.

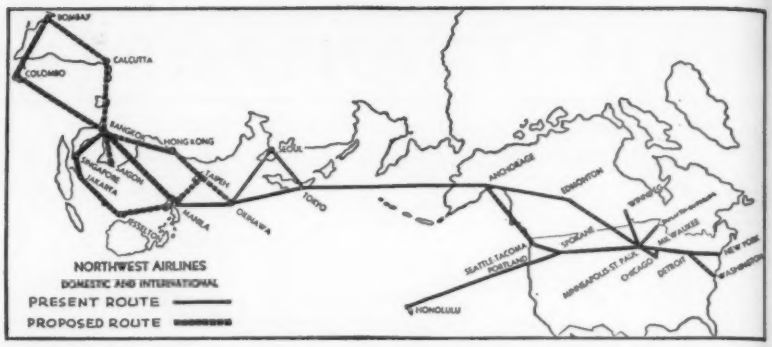
Adm. J. W. Reeves, airport manager for the city of Los Angeles, has agreed that the system should be operated by the city as part of the airport facilities and open to all, but so far no action has been taken. The big carriers say it will cost the city to operate its own system.

Sherman says the line is also having trouble in Oakland. CCA is not permitted to land at the domestic terminal but is shunted off to international. This is unsatisfactory to Col. Sherman and he will take movies if necessary to prove there is room at domestic, then call in the Interim Committee on Public Utilities. He had to take these steps to gain admission to Los Angeles International Airport last year.

UAL Asks Fare Cut

Another air fare cut in time of general U. S. commodity price rises was announced last week when United Air Lines filed with the Civil Aeronautics Board for permission to charge $216 instead of $288 for a roundtrip, California-Hawaii, exclusive of federal transportation tax.

United's proposed roundtrip to Hawaii at about 25% reduction from standard fare is an excursion fare good for roundtrip of 16 days or less on dates between Oct. 15 and Dec. 20.



NWA Asks New Orient Routes

Northwest Airlines has asked Civil Aeronautics Board to grant it 12,000 miles in additional routes in the Orient.

If CAB approves, this will boost Northwest's total route system to over 32,000 miles.

NWA President Croil Hunter points out that signing the Japanese peace treaty "will usher in a new trade era in the Far East. It will open the doors of Japan to a heavy influx of businessmen from India, Java, Singapore, and other thickly populated areas of Southeast Asia seeking to expand their markets. . . . Northwest Airlines, with its short, great circle route to Tokyo by way of Alaska would be in a position to provide quick and easy access to key points."

NWA asks six route extensions from its current U. S.-Far East route pattern. They are:

- **Tokyo to Hong Kong**, Bangkok, Columbo and Bombay.
- **Tokyo to Hong Kong**, Bangkok, Singapore and Jakarta.
- **Manila to Bangkok**, Columbo and Bombay.
- **Manila to Saigon**, Bangkok, Singapore and Jakarta.
- **Manila to Bangkok**, Calcutta and Bombay.
- **Manila to Jesselton** and Jakarta.

Connections at Bombay would be with Trans World Airlines; other possible connections: KLM and Air France for round-the-world flights, supplementing Northwest's present global connections at Tokyo with Scandinavian and British Overseas.

Air Mail Rates

ATA hits Senate group proposal to raise postage to 8 cents an ounce.

Air Transport Assn. has marshaled strong statistics in a statement by ATA President Emory S. Land to spike a Senate Post Office Committee proposal to boost the air mail letter rate from 6 cents an ounce to 8 cents.

The Senate committee approval of a bill to so raise airmail letter charges comes just when the Post Office air mail costs are dropping. Raising the price of air mail now would cause volume to drop about 25%, ATA estimates.

ATA points out that Post Office costs for shipping air mail are down about 30% this year, under new airline mail rates fixed or soon to be fixed by the the Civil Aeronautics Board. Big Four airline rate is down from an average of 63 cents to 45 cents a ton mile; the Big Four—American, Eastern, Trans World and United—tote 80% of the domestic air mail. And airmail rates of the other airlines are expected to drop about 30% this year, too.

▶ **Upside Down?**—Total Post Office cost reduction through lower airline rates this year comes to an estimated $7,600,000 for the Big Four, $3,600,000 for the other domestic lines. Then why, asks ATA, should Congress now increase customer charges by the Post Office by one-third when Post Office costs go down by one-third?

On top of this argument, ATA President Land's statement says Congress fixed on the present 6-cent rate after many experiments showed it to be the rate for maximum air mail revenue. The 6-cent rate was started in 1934. In World War II it was raised to 8 cents and air mail volume fell off from 1,091,000,000 pieces in fiscal 1944 to 716,000,000 in 1946, ATA says. Revenue dropped 11%, from $8,500,000 a month in 1944 to $6,770,000 in 1945. "A major part (of this drop) was clearly attributable to the high rate," says Land, "because the percentage of air mail to total first class mail dropped during this period from 5.02% to 3.68%."

Then the rate dropped to 5 cents Oct. 1, 1946. In one month, volume jumped 40%. First nine months of 1947 saw gains of 42-53%. Then in an effort to get more revenue without

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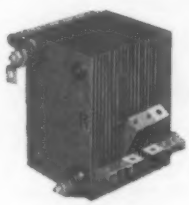
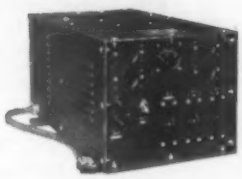


Heavy-duty Federal Selenium Rectifier



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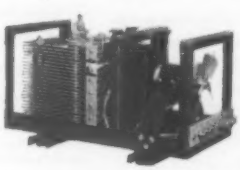
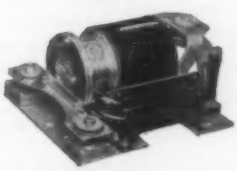


FTR 3146-BS Aircraft Power Supply



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killing the uptrend in volume, the rate was increased to 6 cents on Jan. 1, 1949. Even this modest rate increase caused a slight reduction in volume from 33 million lb. in 1949 to 32 million lb. in 1950, says ATA.

Land concludes: "From this record it appears that Congress has experimented considerably with air mail postage, and has already proved that the existing rate is as high as air mail postage can go economically and efficiently."

A House bill calls for keeping the rate at 6 cents. At hearings early this year, Postmaster General Jesse Donaldson opposed any increase in the rate. Like ATA, he estimated any increase in the rate would so reduce volume as to cut down total revenue.

WAL Operations Halt As Mechanics Strike

Western Air Lines operations were suspended Friday, July 27, when pilots and stewardesses refused to cross picket lines set up by striking members of the Air Carrier Mechanics Assn. Twenty members of the Airline Dispatchers Union also walked out. It was the company's first strike in 25 years.

Federal Mediator James Hollaren was trying to effect a settlement. The union withdrew from negotiations Friday but talked with Hollaren again on Monday.

Both the mechanics union and the Air Line Stewards and Stewardesses Assn. are affiliated with the Air Line Pilots Assn. Western is probably the only airline dealing exclusively with the three affiliate unions.

The walkout of the mechanics followed five months of negotiations between Western and the union. Previous National Mediation Board action proved unsuccessful and the 30-day "cooling-off" period, ordered under provisions of the Railway Labor Act, expired July 8.

▶ **Deadlock**—Negotiations with the mechanics were deadlocked principally over the demand for a union shop with company check-off and collection of dues. The union also demands a "no-farm-out" of work clause. The mechanics want the opportunity to work overtime and double shift at premium pay rather than have the company send any overburden of maintenance work to other facilities.

But Western has made concessions on 15 other demands of the union. Western not only met the union's demand for a 12-cent-an-hour across-the-board pay raise, but offered an additional 5 cents an hour retroactive to Apr. 1. It is now understood the union will seek retroactive pay to Jan. 1, when the old contract ran out.

The day before the mechanics walked out, Western signed a new contract with the stewardess union, which West-

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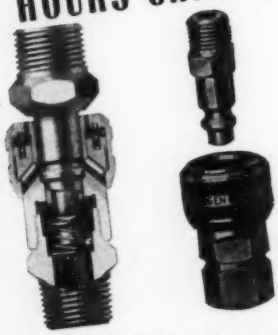

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ern described as a record-high for airlines of its class.

Also affected by the strike of the 300 mechanics and the dispatchers were 180 pilots and 100 stewardesses who refused to cross ACMA picket lines.

The walkout tied up Western's 5,014-mi. system. WAL normally operates 56 daily flight schedules and carries about 2,000 passengers or 638,550 revenue passenger miles daily.

Western is fulfilling its maintenance contracts with Pan American, PanAm's affiliate, Compania Mexicana de Aviacion, and Seaboard & Western's Korea airlift plane by using supervisory personnel, engineers, lead foremen, shop superintendents, and other such personnel.

More Comet Orders

(*McGraw-Hill World News*)

London—BOAC will buy six additional Avon-powered Comets for use on its trans-Atlantic runs. The government-owned airline now has 20 Comets on order from de Havilland Aircraft Co., Ltd.

Of the 20, nine will be powered by D-H Ghost engines for airline stages in the 1,500-mi. range. Delivery will begin in late summer. The planes will be put on BOAC's Rome-Cairo runs by the first of next year, the company hopes.

The new-type Comet will have a range of around 3,000 mi., carrying up to 44 passengers. The older type has seats for only 36; no delivery dates have been set as yet for the newer types of the craft.

Miami Airport Future Debated

A two-day hearing on increased military use of Miami International Airport, called after Air Force units had asked for 500,000 additional square feet of space under a recapture contract clause, ended late last month with civilian witnesses testifying that such a move would seriously impair the country's commercial air service.

A. B. Curry, port director, said that plans were already laid for expenditure of $44.5 million on improvements in the next five years and representatives from Pan American World Airways and Eastern Air Lines stated that they proposed to spend an additional $10 million. Increased military participation at the field would make it difficult to finance such programs, it was held.

One solution offered was that the military reactivate huge Homestead AFB, 28 miles south of Miami. A military spokesman stated, "Congress has

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directed the Air Force to go where it is cheapest, and it is cheapest where it has recapture rights to facilities, such as at Miami International Airport."

It would cost over $3 million to reactivate the Homestead base. Airline representatives said they were not authorized to pay this amount for such a project.

Decision on the hearing will be delayed until August or, perhaps, even a later date.

SHORTLINES

▶**American Airlines**—In the first six months of this year, AA's passenger miles were 1,175 million, up 48% over the same period last year. Mail ton miles for the current year were 6.9 million and cargo came to 22.6 million ton miles. . . . The carrier and Continental Air Lines inaugurated an interchange making possible through-flight service between Los Angeles-San Antonio-Houston.

▶**Avianca**—The Colombian carrier was ordered to stop operating in Ecuador, including international flights, beginning Sept. 1 by the Civil Aeronautics Board of Ecuador. The carrier halted operations on Aug. 1.

▶**British European Airways Corp.**—The carrier earned more than $2,654,400 in revenue during May, its highest monthly earning since company operations began in August, 1946. BEA carried more than 1,000 tons of freight during the month.

▶**British Overseas Airways Corp.**—June passenger and freight volumes on BOAC's New York-London route surpassed all previous one-month records. Revenue passengers numbered 3,810—2,134 eastbound and 1,676 westbound. Air cargo was 151,061 lb.

▶**Colombia**—Ministerio de Relaciones Exteriores has contracted the services of a UN expert through ICAO to advise on the organization of civil aviation in the country.

▶**Compania Cubana de Aviacion**—PAA subsidiary handled 12,715 passengers during June, nearly 20% more than in May. Load factor between Havana-Cuba was 54% and between Miami-Havana 45%. Biggest June traffic gain was in the Havana-Madrid route where business was up nearly 40% over the preceding month.

▶**International Air Transport Assn.**—IATA Clearing House handled $13,514,000 in transactions in May com-

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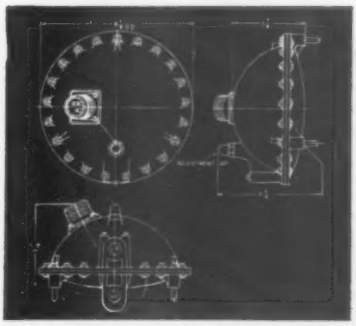

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Differential Type for Ram Air
Sensitivity: ⅛" H_2O
Actuating Pressure Range: 1.50" H_2O to 3 psi with differential of 20% of applied pressure
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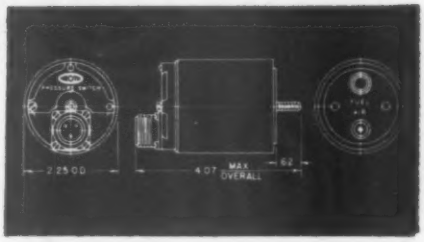

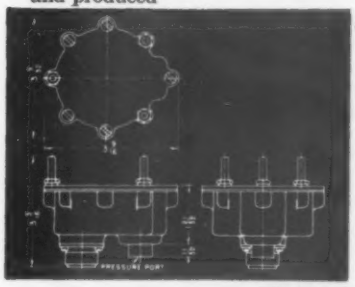

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pared with $11,281,000 in the same month last year. Total turnover for the first five months of this year came to $61,919,000 compared with $51,757,000 in the first five months of 1950. During May, 85.6% of the turnover was offset.

► **Pan American World Airways**—PAA planned to begin four more roundtrip tourist-type flights between San Juan-New York on Aug. 1 to accommodate record-breaking summer traffic, thus providing 75 northbound and 71 southbound flights weekly between the island and the mainland. . . . During the first five months of 1951, PAA's cargo carried climbed 27 percent. Average overall load factor for the entire system was 63 percent, a 15 percent increase.

► **Pioneer Air Lines**—PAL has flown its 500,000th passenger. In the first seven months of this year the carrier has boarded almost 90,000 passengers, and on Aug. 1 celebrated its sixth anniversary.

► **Portland (Ore.) Airport**—A new 8,800-ft. runway has been completed except for lighting facilities and radio landing aids. When these facilities are in, expected some time in August, the field will be re-named Portland International Airport and will be used by Northwest Airlines and Pan American for flights to and from Hawaii. Cost of the runway was some $1.5 million, with the Port of Portland paying 44% and the government putting up the remainder.

► **Seattle Port of Embarkation**—In three years, airborne movement of perishable food from Seattle to Alaskan military installations has increased from 8,500 lb. to more than 150,000 lb. each week. Fourteen military and three commercial planes are used.

► **Slick Airways**—Executive and administrative personnel have moved from temporary office quarters in Burbank, Calif., to the just completed $200,000 Slick administration building at 3000 N. Claybourn, Burbank, adjacent to the scheduled freight carrier's two hangars on the west side of Lockheed Air Terminal.

► **Stark Air Travel Service**—Limousine service was scheduled to start daily service from 120 Wall St., N.Y.C., to La-Guardia Field at 4 p.m. DST, excepting Saturdays and Sundays.

► **Trans-Oceanic Airways**—The Australian carrier is understood to be planning to purchase another Short Solent four-engine flying boat and also some Short Sealand amphibians, the latter for internal services in Tasmania.

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AVIATION CALENDAR

Aug. 6—International air race for the Daily Express Cup, England.

Aug. 11—Summer session of the Aircraft Manufacturers Council, Western Region, of the Aircraft Industries Assn., Seattle, Wash.

Aug. 11-19—Eighth annual Michigan aviation week, sponsored by the Aero Club of Michigan.

Aug. 15-19—Fifth annual all-woman transcontinental air race, sanctioned by the Ninety-Nines, Santa Ana, Calif., to Detroit, Mich.

Aug. 18-19—National Air Race, Detroit, Detroit-Wayne Major Airport.

Aug. 22-24—Western convention of Institute of Radio Engineers and Seventh Annual Pacific electronic exhibit.

Aug. 22-26—International convention of the Ninety-Nines, Mackinac Island, Michigan.

Aug. 24-26—Fifth annual convention of the Air Force Assn., Ambassador Hotel, Los Angeles, Calif.

Sept. 3-7—Royal Aeronautical Society-IAS third international areonautical conference, Brighton, Sussex, England.

Sept. 10-14—Sixth national instrument conference and exhibit sponsored by the Instrument Society of America, Sam Houston Coliseum, Houston, Tex.

Sept. 10-16—Seventh annual general meeting of the International Air Transport Assn., Westminster School, London, England. Program includes one-day visit to SBAC Farnborough show.

Sept. 11-16—Twelfth flying display and exhibition of the Society of British Assn. of Constructors, Farnborough, England.

Oct. 2-4—Seventh annual aircraft spark plug and ignition conference sponsored by the Champion Spark Plug Co., of Toledo, Ohio.

Oct. 8-10—Special conference on aircraft electrical applications, sponsored by the Air transportation committee of the American Institute of Electrical Engineers and the Los Angeles section of the Institute, Hollywood Roosevelt Hotel, Hollywood, Calif.

Oct. 11-12—1951 conference on airport management and operation, University of Oklahoma, Norman, Okla.

Oct. 16-17—Fourth annual New York State conference on airport development and operations, sponsored by the N. Y. State Dept. of Commerce, N. Y. Aviation Trades Assn., Assn. of Towns of the State, Conference of Mayors, County Officers' Assn. and the N. Y. State Flying Farmers, Onondaga Hotel, Syracuse, N. Y.

Oct. 24-25—1951 annual convention of the National Assn. of State Aviation Officials, Arizona Inn, Tucson, Ariz.

Oct. 29-30—Air Industries & Transport Assn. of Canada annual general meeting, Seigniory Club, Montebello, Quebec.

PICTURE CREDITS

9—(Bell X-5) Keystone; (Tu-10) Heinl; (4-0-4) Glenn L. Martin; (Bournemouth) Keystone; 16—Lockheed; 21-22—Avro Canada; 32—Edo Corp.; 41—de Havilland.

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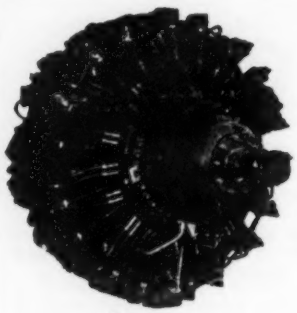

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130	8288	Follower Assy.
27953	8427	Screw
1276	10759	Bolt
900	11210	Cover
100	11762	Guide
1157	35787-5	Bushing
2174	35787-10	Bushing
814	35814	Blower Assy.
3967	35817	Spring
280	35855	Cap
2446	35924	Washers
4200	35932	Gasket
22	36759	Rod Assy.
182	46400E	Liner
30	48346	Cylinder
1475	48360	Bearing
53	48362	Shaft
175	48363	Shaft
100	48389	Fitting
209	48390	Retainer
56	48392	Sump
533	48447	Bushing
107	48457	Adapter
390	48461	Gear
149	48468	Bearing
90	484688	Bearing
389	48469	Bearing
470	48470	Bearing
75000	51506	Plug
395	54847	Clamp
71	57006	Cover
78	76236	Gear
565	81397	Tube
10736	84185	Cover Assy.
261	84235	Pipe
155	84281	Spacers
1351	84282	Adapter
1178	84289	Bearing
113	84487	Housing
87	84567-8	Stud
77	84591C	Nose Housing
178	84602	Bracket
30	84702	Shroud
397	84752	Bearing

ELECTRONIC COMPONENTS

Quantity	Part No.	Description
35	RA-10-DB	Receiver
20	TA12B	Transmitter
150	DA-1F	Dynamotor
35	MR-9B	Control Box
9000	45	Bulb
11000	1667	Bulb
1000	987	Bulb
300	AN3135-1	Bulb
97	FT213A	Mount
29	FT293	Mount
80	BX42-7	Dynamotor
6	RTA-1B	Transceiver

WALTER KIDDE FIRE AND OXYGEN EQUIPMENT

Quantity	Description
341	981280 Cylinder CO^2 w/valve Wt. Empty 18.5 lbs. Wt. of Charge 12.6 lbs. Valve number 979453 J
19	M870036B Cylinder CO^2 Wt. Empty 5.48 lbs. Wt. of Charge 3.62 lbs.
22	982512 Cylinder CO^2 w/valve Wt. Empty 11.65 lbs. Wt. of Charge 7.25 lbs. Valve number 979453 J
96	992255 Cylinder CO^2 (type 5A-hand fire extinguisher) Full wt 14.3 lbs.
93	923748 Oxygen cylinder (full) w/valve #X4015 Charges to 1800 PSI
150	982056 Valve 1-1/2" flare tube threads
150	966129 Solenoid (28 Volts)
225	981591 Gate Valve With 3 1-1/2" Flare tube threads
151	870082 (Model A4614) pressure switch Manually or pressure operated
326	982585 Gate Valve with 1-1/4" Flare tube threads

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1000	AN 5780-2	Wheel and flap position Indicator G. E.—Individual cans
400	AN 5780-2	Weston Model 882-PN11602 Description as above
1500	AW 2-65B	U. S. Gauge Air Pressure Gauge (0-2000 lb.)
160	2E-492E	Pesco fuel pumps
700	TFD 8600	Thompson fuel booster pump
125	D-7818	Adel anti-icer pumps
170	2-P-771-A	Pesco fuel pump AN4102-1
250	AN4014	Erie Meter Systems D-3 hand wobble pump
300	1H260k and KA	Pesco Hydraulic hand pump
478	D9530	Adel selector valve
233	D9530-2	Adel selector valve
428	D9560-2	Adel selector valve
744	D10044	Adel selector valve
2200	AN 4078-1	37D6210 Solenoid United Aircraft etc.
2000	AN 3096-4	Grimes Light assembly
800	AN 3096-5	Grimes Light assembly
380	AN 3096-6	Grimes Light assembly
175	EE 709-M2	Air Associates Motor
115	P4CA2A	Parker Primers
80	AN 3213-1	Scintilla Ignition switch
568	A-9 (94-32226)	Ignition switch
687	RS-2	Mallory Selector boxes
380	AN 6203-1	Vickers Hydraulic Accumulator
88	572-3A	Eclipse Distributor Valve
90	JH-950R	Jack & Heintz Starter Motor for JH5 starters
492	S841 (94-32253)	Electric box
12	FA122	Flasher Exterior lights Wallace & Tiernan
1000	13018A	Interphone Box
244	D10051	Selector Valve (Adel)
135	10996A	Instrument Panel for Republic Seabee
144	K14949E	Windshield Wiper Kit (Marquette Metal Products)
42	400AJ3	Lear Actuator
161	420EC	Lear Actuator
160	420DY	Lear Actuator
195	550AJ	Lear Screw Jack
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SIDELIGHTS

(*Continued from page 8*)

AFA president, was nominated for AFA chairman. Both men will be voted on during the AFA convention in Hollywood, Calif., Aug. 24-26. . . The second Boeing KC-97 **refueling squadron** is being established at MacDill AFB, Fla. The base is scheduled to be headquarters for B-47 flight training. . . **Continental Air Command**, presently headquartered at Mitchel AFB, N. Y., and scheduled for a move to Grandview, Mo., will remain in New York until after 1953. . . **Lt. Gen. George Stratemeyer**, former commander of Far East Air Forces, stricken by a heart attack May 20, was released from the hospital in Tokyo last week. He will convalesce at home. . . **Inflation** has jumped USAF base construction congressional requests by $87 million over previously planned requirements.

Transport

Capital Airlines last week started using a mechanical airline **ticket vendor**, similar to those used to issue tickets and make change at stores and movies. First installation is at Washington National Airport. Capital thinks this gadget will speed ticket issuing, thereby eliminating one of the chief passenger gripes—long waits at the ticket counter. . . Flying Tiger Line has started a new series of fast **overnight air freight** schedules between the Midwest and both coasts. Traffic Vice President George Cussen credits purchase of 18 C-46s last fall with enabling the company now to offer heavier schedules. A rundown of Flying Tiger Line's equipment use on a typical day shows: 11 planes on domestic air freight routes to 24 cities on six daily schedules; five flying the Pacific airlift; four shuttling south as far as Guadalajara, Mexico, returning illegal immigrants; two hauling Air Force trainees from San Antonio to advanced training bases; two flying special passenger labor charters from Puerto Rico to New Jersey; two flying similar charters from El Paso to North Dakota farms; one carrying displaced persons from Germany to Australia; one on a trans-Atlantic student travel tour; two on military charter flights from U. S. to Alaska, and Massachusetts to New Mexico; and five planes at the Tiger's Burbank maintenance base. . . **Delta Air Lines** has contributed $5,000 to the University of Tennessee to establish an air transportation scholarship. . . **Ray & Ray**, airline consultants in Washington, D. C., have been authorized to make a survey of air transport needs of the states of Idaho, Oregon, and Washington, cost to be shared equally by the three states, for use in the Empire certificate renewal proceedings.

Industry

A fluid hydroformer engineered by M. W. Kellogg Co. will be able to convert 55-octane virgin gasoline into 98/175-octane aviation gasoline. The plant will have a 2,000-barrel-per-day capacity and will be located at the Destrehan, La., refinery of the Pan-Southern Corp. . . Solar Aircraft Co., San Diego, has made **11 patents available** for free use by the public, U. S. Patent Office reports. Among them: an aircraft combustion heater, a centrifugal casting machine for forming exhaust parts for aircraft engines, a tube-bending machine, a die-forming machine combining press and hammer action in a single continuing operation.

Civil Aviation

A suggested uniform state plan for **civil aviation mobilization** and civil defense has been sent by CAA Administrator Charles F. Horne to governors of the 48 states for action by state civil defense agencies and departments of aviation. Plan would set up state aviation directors as coordinators for civil aviation defense activities, assisted by aviation advisory councils and reporting to the state civil defense directors of transportation. Area, county and local organizations are provided for in the plan. . . CAA warns pilots of small aircraft they must file a **declaration of temporary sojourn** with the U. S. Collector of Customs at departure before crossing an international boundary. Biggest headache is Canadian travel. Reports to CAA show many personal planes are jaunting over into Canada, then finding they should have contacted their home Collector of Customs Office first. . . CAB has put out a 14-page pamphlet on "Mountain Winds and Their Effects on Flight," by George M. French of the CAB Safety Investigation Bureau.

WHAT'S NEW

New Books

Introduction to the Study of Aircraft Vibration and Flutter, by Robert H. Scanlan and Robert Rosenbaum. Published by The Macmillan Co., 60 Fifth Ave., New York 11; 428 pages; $7.50.

This book is an introductory treatise, aimed at the practicing engineer who is not thoroughly familiar with modern techniques of aircraft dynamics, and at the senior or graduate student who has elected to specialize in aircraft vibrations and such.

The first six chapters are devoted to the mathematical explanations of methods and basic beam structural relationships. The rest of the book considers beam vibration, two- and three-dimensional flutter theory, instrumentation and testing and the application of methods to the solution of wing torsional divergence, aileron reversal and similar flutter problems.

It was the intent of the authors to present a summary of representative American engineering practice in the field of aeroelasticity. They are to be congratulated for writing for a field where Timoshenko and den Hartog have long held absolute power. And while it would surely be impossible to present a "readable" book in this particular field, the authors and editors have accomplished a great deal, by style and typography, in making the book easy to use.

There is also included a 20-page bibliography of associated reference literature, grouped alphabetically by subject: such comprehensiveness further rounds out the good impression created by the book.—DAA

McGraw-Hill Directory of Chemicals and Producers. Published by McGraw-Hill Publishing Co., 330 West 42d St., New York 18, 1951. $20, with 10 percent discount to purchasers of 5 or more copies.

The versatility expected of aircraft companies today has plunged them into many alien fields, including atomic physics, electronics and chemistry. In these areas, engineers and production people have to build entirely new vocabularies, new contacts and new sources.

Those who are working with chemicals in any form will find this new directory extremely useful, because it lists American chemical manufacturers, their chemical products and the grades of these products.

Accuracy and completeness were insured by having the producers themselves supply the detailed information which was to be collated in this single volume.

All purities and grades of chemical products are listed separately with pertinent shipping data. Shipping points are indicated when the supplier has several factories.

The book is convenient in size, and easy to use. The typography and style make for easy reading.

It would seem to be a "must" item for every purchasing department in the aircraft and allied industry. —DAA

The Aeroplane Directory (1951 edition,) incorporating Who's Who in British Aviation. Published by Temple Press Ltd., Bowling Green Lane, London, E.C.1., 689 pages, including index; $2.10.

Latest volume of this as-usual thorough compendium of British Empire aviation takes note of the industry's expansion with inclusion of more data on more companies.

But a continuing decrease in the number of air charter firms still operating is noted.

New Addresses

Aircraft Tools, Inc., has opened a new and larger plant at 9030 Bellanca Ave., Los Angeles 45.

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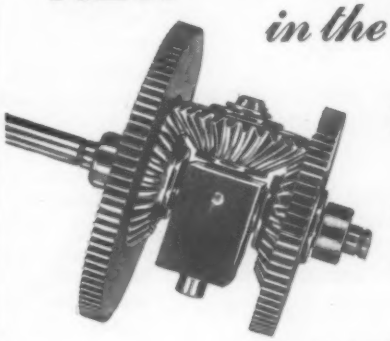

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EDITORIAL

An Industry's Conscience

Just about four years ago, AVIATION WEEK's first issue appeared—July 7, 1947. In the past year or so we have acquired several generations of new subscribers, as our circulation has approached the 35,000 mark.

Some of these subscribers, lacking early explanations on this page, write us their surprise at editorials in an aviation magazine that ever point out anything wrong with things aviation.

On this fourth anniversary, we are jotting down a few notes about AVIATION WEEK's editorial platform.

Criticism

First, criticism here is always meant to be constructive. We want aviation to progress. We have unbounded faith in aviation's future. But although this is an aviation business paper, we don't have the editorial attitude that everything about aviation is perfect, or that we defend industry whether it is right or wrong. We are the apologist for no group within industry; nor are we anyone's tub-thumper. If we had wanted to "play it safe," AW would have discontinued its editorial page long ago, as some business magazines have done. But in that case we would always follow industry, seldom nudge it forward, and never lead it.

The Platform

The crux of our editorial policy is to encourage the utmost development of aviation to serve safely and efficiently the most people at the lowest cost. We think this can be done only by private initiative in the free enterprise system.

The paragraph above covers military as well as commercial aspects of aviation. Today we refer mainly to commercial aviation.

Safety

Aviation must strive vigorously, relentlessly, and forever, for greater safety. It is the top problem, always.

Subsidies

We are against any subsidies that can be avoided, or those that are not diminished as soon as the infancy phase passes for any segment of the business. Subsidies should be reduced at the most rapid possible rate that good business methods and improving income will permit.

Competition

We favor competition in both manufacturing and transport. We shall always urge a fair hearing to those who ask an opportunity to do a better job at less cost. Monopolists in business should be allowed to have no monopolies in ideas. If newcomers can show they can set up a yardstick for the oldtimers, give them a cautious trial, and let them in if the Old Guard refuses to improve its ways. Few companies or industries operate at maximum efficiency without competition or threat of it. Progress is made by those who are perpetually dissatisfied with the status quo. Aviation abhors the status quo as nature abhors a vacuum.

Because we believe this, we supported the air freight lines in their long fight for certification. We have supported a trial for the non-mail passenger carriers for similar reasons. If any of them succeed in carving a niche for themselves, creating a new market and serving it, they should stay. So we have urged that some of the nonskeds be given a chance. Every new convert to flying is a new customer for all commercial aviation.

Government

Our attitude toward government—whether it be CAA, CAB, the Air Force, or the President of the United States—is that fundamentally government is the servant—not the master—of the people.

One of the obligations of the press is to reflect the will of the people. We have confidence in public opinion and in the intelligence of Americans. We hope to lose few opportunities to bring to light any public servant who gets too big for his job and fails to remember his proper place in the scheme of things in this democracy. Let him not forget who pays him, and why. The people have a right to honest, conscientious, and able service on the part of those in their government. They have a right to expect decisions based on public service, not on politics and self-ambition. They furthermore have a right to know what their government is doing and how their money is being spent—except for the most secret work involving national defense.

Government Regulation

We are for all possible industry self-regulation and as little government control as possible. The more independent of government subsidy an industry is, the stronger can be its arguments for self-regulation. The better an industry's product is, the less excuse government has for taking over industry or any part of industry's job. In transportation, we believe CAB has done more to retard commercial aviation in the past four years than it has done to advance it. In manufacturing, trends toward more aircraft designing by government rather than industry have alarming possibilities.

Service & Lower Rates

Aviation cannot continue to lure new patrons from surface transport, or persuade others to use aviation for business they otherwise would not conduct at all, unless rates for all air services remain low or drop in relation to other transportation. So we have little patience with those who seek to jack up rates to the public merely to pile profits on profits. The big profits will come, but only if aviation becomes mass transportation.

So we have dinned away for maximum development of air coaches, because they discourage unnecessary frills and bring lower fares and mass transportation that much nearer.

Public Welfare First

Any industry that puts its own interests ahead of the public's is doomed to a sad awakening. Sometimes this fateful day comes swiftly; sometimes it lurks hesitantly in the background for years. But it always comes. So, we view AVIATION WEEK as more than a chronicler, analyst, teacher and missionary. Perhaps its editorial page can also be an industry's conscience.

—Robert H. Wood

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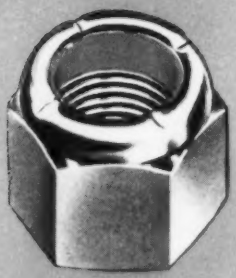

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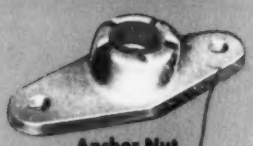

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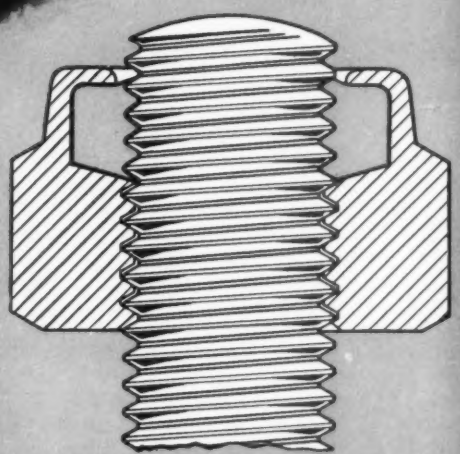

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